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UNIVERSITY OF NEW HAMPSHIRE

UNDERGRADUATE CATALOG

1994–1995

BULLETIN

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1994–1995 University Calendar

Summer Session 1994

May 31–August 5

Semester I

August 26, Friday
Residence halls open for new freshmen

August 27, Saturday
Schedule pickup and academic advising for new freshmen

August 28, Sunday
Residence halls open for upperclass students

August 29, Monday
Registration/Academic Advising for new transfers and continuing students who need assistance

August 30, Tuesday
Classes begin—follow Monday schedule

September 5, Monday
Labor Day holiday—no classes

September 6, Tuesday
Last day to withdraw and qualify for 3/4 tuition refund

September 6–7, Tuesday–Wednesday*
Rosh Hashanah

September 15, Thursday*
Yom Kippur

September 16, Friday
Last day to add courses without dean's approval and without $25 late add fee
Last day to drop courses or change to audit without $25 late drop fee
Last day to choose pass/fail option

September 23, Friday
Last day to file an Intent to Graduate form for Dec. 1994 graduation without late fee

September 30, Friday
Last day to withdraw or drop to part time and qualify for 1/2 tuition refund
Last day to drop courses or change to audit ($25 per course late fee continues to apply)
Last day to carry more than 20 credits without a surcharge

October 14, Friday
Midsemester
Last day to withdraw from the University without grades of WP or WF

November 8, Tuesday
Election Day—no exams can be scheduled

November 11, Friday
Veterans Day holiday—no classes

November 23, Wednesday
Classes follow Friday schedule

November 24–25, Thursday–Friday
Thanksgiving holiday

November 28, Monday
Classes resume

December 2, Friday
Last day an announced oral or written exam may be given before final exam period

December 9, Friday
Last day of classes

December 12, Monday
Reading Day—no classes

December 13, Tuesday
Final exams begin

December 17, Saturday
Final exams end

December 26, Monday–December 30, Friday
Christmas holidays—offices closed

December 31, Saturday
Graduation date (no ceremony)

January 2, Monday
New Year's holiday—offices closed

Semester II

January 15, Sunday
Residence halls open

January 16, Monday
Martin Luther King, Jr. holiday—offices closed

January 17, Tuesday
Registration/Academic Advising for students who need assistance

January 18, Wednesday
Classes begin

January 24, Tuesday
Last day to withdraw and qualify for 3/4 tuition refund

February 3, Friday
Last day to add courses without dean's approval and without $25 late add fee
Last day to drop courses or change to audit without $25 late drop fee
Last day to choose pass/fail option

February 10, Friday
Last day to file an Intent to Graduate form for May 1995 graduation without late fee

February 17, Friday
Last day to withdraw or drop to part time and qualify for 1/2 tuition refund
Last day to drop courses or change to audit ($25 per course late fee continues to apply)
Last day to carry more than 20 credits without a surcharge

March 10, Friday
Midsemester
Last day to withdraw from the University without grades of WP or WF

March 13–17, Monday–Friday
Spring Break

March 20, Monday
Classes resume

April 14, Friday*
Good Friday

April 15, Saturday*
Passover

April 16, Sunday*
Easter

April 21, Friday*
Orthodox Good Friday

April 23, Sunday*
Orthodox Easter

May 2, Tuesday
Last day an announced oral or written exam may be given before final exam period

May 9, Tuesday
Last day of classes

May 10–11, Wednesday–Thursday
Reading Days—no classes

May 12, Friday
Final exams begin

May 18, Thursday
Final exams end

May 19, Friday
Senior Day

May 20, Saturday
Commencement (10:30 A.M.)

Summer Session 1995

May 30–August 4

The University reserves the right to modify this calendar subsequent to printing. Refund policies are currently being reviewed by the Trustees. Refund deadlines may change from those in this calendar.

*These holidays, important to many members of the University community, are not University holidays, but they are listed here to facilitate planning of University events. Faculty and staff should be sensitive to the needs of those who celebrate these and other holidays.

General Information

The University

The University of New Hampshire, founded in 1866 as the New Hampshire College of Agriculture and the Mechanic Arts, was among the early state institutions of higher education whose formation was made possible by federal government land grants to establish colleges to serve the sons and daughters of farming and laboring families.

First situated in Hanover in connection with Dartmouth College, New Hampshire College moved to its Durham campus in 1893 after Benjamin Thompson, a prosperous farmer, bequeathed land and money to further the development of the college.

The college thrived in Durham, and in 1923 the state legislature granted it a new charter as the University of New Hampshire, composed of the College of Agriculture, the College of Liberal Arts, and the College of Technology. The Graduate School was formally added in 1928. The two-year program in agriculture, which had been offered since 1895, was formally recognized in 1939 and is now the Thompson School of Applied Science. The Whittemore School of Business and Economics was established in 1962.

In 1963, the University System of New Hampshire was created when the teachers colleges at Plymouth and Keene were brought under the same board of trustees as the University. In 1969, the state legislature recognized the extended functions of the College of Agriculture, renaming it the College of Life Sciences and Agriculture. The School of Health Studies was also established as part of the University's programs. Beginning in 1971, the Division of Continuing Education was authorized to offer associate in arts degree programs for New Hampshire residents. In 1975, the College of Technology was renamed the College of Engineering and Physical Sciences, and in 1989, the School of Health Studies became the School of Health and Human Services.

In 1984, the University began offering courses to residents of the most densely populated region of the state through the Nashua Center. In 1985, the state legislature incorporated the University of New Hampshire at Manchester as the sixth academic division of the University. The college offers selected baccalaureate and graduate programs for commuter students in the Merrimack Valley region. It also provides credit and noncredit continuing education courses.

Academic and cultural resources of each campus are amplified through System-shared programs and facilities. Cooperative ventures among the twelve member institutions of the New Hampshire College and University Council combine public and private higher education resources.

Mission

In the 1993–94 academic year, the University of New Hampshire had 13,066 degree candidates enrolled, including 463 in the associate in applied science program of the Thompson School, 669 in the University of New Hampshire at Manchester, 172 in the associate in arts program in the Division of Continuing Education, and 1,566 graduate students. In the Division of Continuing Education, 1,508 special (nonmatriculated) students also were enrolled.

The University's full-time teaching faculty of approximately 660 provides a ratio of one full-time faculty member to about seventeen full-time students. Eighty-five percent of the full-time faculty members hold doctoral or terminal degrees, and many have earned national and international reputations in their professional fields. The University engages in regular evaluation of each faculty member's teaching by students and colleagues. Such evaluation is intended to promote excellence in teaching and is used in tenure, promotion, and salary decisions concerning teaching faculty.

The University of New Hampshire is unique among educational institutions in the state. By its original land-grant charter, the University combines the professions with the liberal arts and sciences and serves the public need for educated citizens. This mission, confirmed by the achievement of sea-grant and space-grant status, has expanded as the University has evolved. Now the largest and most diverse educational institution in the state, the University offers a broad array of undergraduate programs, professional programs, and research and graduate programs. Its primary purpose remains service to the citizens of New Hampshire. To serve the state well, the University has achieved national and international stature.

The modern land-grant university has a threefold mission: the scholarly function of teaching, research, and public service are mixed and balanced in a wide variety of programs.

Teaching. All students at the University, from beginning to advanced levels, share the freedom of the faculty to follow academic interests in various directions. Yet all learning that can be shared rests on the foundation of common knowledge and basic skills, and therefore all undergraduate programs of instruction at the University are built on a program of general education. The objectives of general education carry though the undergraduate subject major, as students refine and apply their skills and discover the relationships among fields of study. At the graduate level, students achieve independence as scholars. The moderate size and full scope of the University offer students at every level the advantage of close contact with individual faculty. That this faculty is dedicated to research and artistry is also an advantage for students, because active scholars and artists teach by sharing their own learning.

Research. The activity of research embraces all the arts and sciences at the University. This activity is valuable in itself as it results in original contributions to human understanding and expression, but it is also an integral part of both undergraduate and graduate programs. In doctoral study, and in many master's programs, thesis research is a primary mode of learning. As a land-grant, sea-grant, and space-grant institution, the University of New Hampshire has a special obliga-

tion to conduct applied research in the areas of agriculture, engineering, and marine sciences, and to disseminate the findings to the state and nation. Although any university must be selective in its quest for excellence in research, the only public university in the state has the responsibility to meet the public need for a broad scope of pure and applied research. The obligation not only to know but to share knowledge extends the University to the larger world of learning.

Public Service. The University is likewise cosmopolitan in its public service activities. It fulfills its special responsibility for the welfare of the state through UNH Cooperative Extension, through the Division of Continuing Education, and through research and consultation on particular needs of New Hampshire citizens. Likewise, the array of professional and graduate programs at the University reflects not only the distinctive expertise of the faculty but also the dedication to the state and region. Outside the classroom, too, participation in an academic community dedicated to the public interest inculcates an ethic of public service.

The University of New Hampshire is dedicated to collaborative learning inside and outside the classroom. By long tradition, it puts concern for humanity at the center of learning and attends to the ethical dimensions of the intellectual enterprise. From this standpoint, the University community is committed to the free and open exchange of ideas and prizes the scholarly virtues of integrity and honesty. It prepares students for full and active participation in a democratic society.

The Campus

The home of the main campus of the University is Durham—one of the oldest towns in northern New England—near the seacoast of New Hampshire. The semirural town still retains traces of its colonial past.

The 200-acre campus is surrounded by more than 3,000 acres of fields, farms, and woodlands owned by the University. A stream flowing through a large wooded area in the middle of the campus enhances the natural open space among the buildings (74 for teaching, research, and service; and 36 residence halls).

The *University Library* houses one million volumes, 6,000 periodical subscriptions, one million government documents, patents, maps, sound recordings, compact disks, video cassettes, manuscripts, and other related material. Specialized subject collections in chemistry, engineering and mathematics, biological sciences, and physics are housed in four branches administered by a physical sciences librarian and a biological sciences librarian.

Athletics–physical education facilities include indoor and outdoor swimming pools, tracks, and courts; gymnasiums; weight training and gymnastics rooms; a dance studio; a number of playing fields; and an indoor ice rink.

The *Memorial Union Building* contains student activities offices, auditoriums and meeting rooms, food services, games and craft areas, and lounges.

The *Paul Creative Arts Center*, home of the departments of the arts, music, and theatre and dance, contains two theatres and The Art Gallery.

Thompson Hall is the main administration building.

College Woods includes 5 miles of well-kept paths through 260 acres of woods.

The *New England Center*, created as a cooperative effort by the six state universities of New England, offers outstanding continuing education programs and provides modern facilities for adult education conferences and seminars in its residence-dining-learning center.

The *John S. Elliott Alumni Center* houses the alumni and development offices and serves as a focal point for alumni activities and campus meetings.

The University's *computing facilities* operate 365 days a year, 24 hours a day. They include large VAX and PRIME mainframes, plus numerous microcomputers.

The campus of the *University of New Hampshire at Manchester* is located at two sites, *French Hall* on Hackett Hill and *The University Center* in the city's historic millyard area.

Accreditation

The University of New Hampshire is accredited by the New England Association of Schools and Colleges, Inc., which accredits schools and colleges in the six New England states. Accreditation by the association indicates that the institution has been carefully evaluated and found to meet standards agreed upon by qualified educators. Specialized programs of study are also accredited by various professional organizations.

All degree programs at the University of New Hampshire are approved for veterans' educational benefits. Individuals are encouraged to contact the veterans coordinator in Stoke Hall about specific questions.

The University of New Hampshire supports the efforts of secondary school officials and governing bodies to have their schools achieve regional accredited status to provide reliable assurance of the quality of the educational preparation of its applicants for admission.

Admissions

The University welcomes visitors to campus. Candidates are encouraged to contact the Office of Admissions to arrange for a group information session, interview, or tour of campus with a student admissions representative. These representatives are qualified to give information about the University and the criteria used by the Admissions Committee in reviewing candidates, and they are best able to discuss student activities, living arrangements, and other aspects of UNH life. A professional staff member oversees each day's interview activity and is available to assist candidates with special concerns or questions. Also, frequent Saturday morning and weekday group information sessions led by an admissions staff member and student representatives are followed by guided tours of the campus. Please call the Office of Admissions (603-862-1360) for information.

Admission Criteria

Admission to a bachelor's degree program is based upon successful completion of a four-year secondary school program of college preparatory coursework. Primary consideration is given to academic achievement and aptitude, as demonstrated by the quality of candidates' secondary school course selections, academic achievement, recommendations, and the results of a College Entrance Examina-

tion Board Scholastic Assessment Test (SAT I: Reasoning) or results from the American College Testing program (ACT). Strong consideration is given to character, initiative, leadership, and special talents. Students at the University are asked to sign a statement of commitment to uphold the University's standards for personal behavior and integrity.

The choice of secondary school program and courses may limit or enhance opportunities and achievements in college. Candidates are strongly encouraged to extend their knowledge and learning skills through work in the basic academic disciplines. Most successful candidates present at least four years of English and mathematics, three years of laboratory science, and two years of social science. Recommended mathematics preparation includes algebra I, geometry, algebra II, and trigonometry. Successful candidates have generally completed three years of study in a single foreign language or have completed more than one year of study in each of two different languages.

International students whose primary language is not English must submit the results of a Test of English as a Foreign Language (TOEFL). The recommended minimum TOEFL score is 550.

Candidates are expected to pursue in greater depth those fields in which they have special interests. For example, students who plan to specialize in engineering, science, mathematics, or forestry should present at least four years of mathematics including trigonometry, as well as laboratory coursework in chemistry and/or physics. Students pursuing business-related studies should have also completed four years of mathematics including trigonometry. For students planning to major in health-related disciplines, secondary school laboratory courses in biology and chemistry are strongly recommended.

Applicants who have identified specific academic fields of interest are asked to indicate their "prospective" majors so that the University may evaluate their credentials in terms of their academic objectives. Undecided candidates may apply for admission as "undeclared" applicants for each of the University's five school and college divisions.

Many University students request a change in major during their undergraduate years, and most are approved. These changes are possible after a student has been at the University for at least a semester and has secured permission from the appropriate college dean and department chairperson. In recent years, however, the University has not always been able to honor all requests for a change of major, most notably into biological sciences, communication, psychology, environmental conservation, nursing, occupational therapy, and athletic training.

Admission Tests Requirements

All candidates for admission to bachelor's degree programs are required to submit the results of a College Entrance Examination Board Scholastic Assessment Test (SAT I) and/or the American College Testing program (ACT). While achievement tests are not required, a score of 500 or higher on foreign language achievement tests satisfies the foreign language requirement of the bachelor of arts degree programs. Students who have identified a specific major are encouraged to submit Subject Test (SAT II) results relating to that major. For example, an engineering applicant could submit math and physics or chemistry test results.

Art and Music Candidates

Candidates applying to any program within the Department of the Arts (except art history) are required to submit a portfolio to the department chairperson (603-862-2190). Candidates applying for programs in the Department of Music must make arrangements with the chairperson of that department for an audition (603-862-2404). Details regarding these requirements may be obtained from the departments or the Office of Admissions.

Freshman Admission Application Deadlines

Except for early notification candidates, applications should be submitted after the first marking period grades for senior year are available and before February 1. Applications received after that date may be considered only on a space-available basis.

Candidates who apply for regular admission by the February 1 application deadline will receive notification by mid-April. Accepted candidates are required to confirm their intention to enroll with the payment of an enrollment fee ($300) by May 1.

Early Notification

Between September 15 and December 1, the University considers well-qualified freshman applicants who desire fall enrollment under the early notification program. The University's early notification program places no obligation on the applicant to enroll if accepted for admission. The benefits for the successful early notification applicant are an early resolution of the question of admission to the University and priority in the selection of a University residence hall if the student ultimately chooses to enroll. Unsuccessful early notification applicants will be reconsidered in the regular admissions process after receipt of senior year, first semester grades. Early notification applicants must submit a regular application, secondary school record, the results of the SAT I and/or ACT, and a counselor's letter of recommendation. Decisions will be reported by January 15 on all early notification candidates who have observed the application deadline.

Deferred Admission

The University considers applicants for deferred admission, which enables students to reserve a space at the University while taking time off from school for work or travel. The University may not be able to offer deferred admission in certain program areas, however.

Advanced Standing

The University recognizes outstanding secondary school work by means of advanced placement and credit for those who have taken enriched or accelerated courses before entering college. Applicants qualify for such credit by successfully completing coursework for college credit and satisfactory achievement on University approved placement examinations, including the College Board Advanced Placement Tests, or through the College Level Examination Program (CLEP).

The University accepts College Board Advanced Placement Tests in every subject area. The minimum score accepted is 3, with credit and course equivalency based on the score achieved. Contact the

Office of Admissions for further information (603-862-1360).

The University recognizes the College Level Examination Program. Up to 32 semester credits of General Examination tests may be applied as elective credit only. Scores must be 50 or better in each sub-area of humanities, natural science, social science or history. The minimum score for mathematics is 500 and for the English exam with essay 500. Subject exams when applicable may be used to satisfy both departmental and general education requirements.

Maximum credit accepted for all credit by exam or advanced placement testing is 64. Further information may be obtained from the Office of Admissions.

Associate Degree Candidacy

The University accepts candidates for associate in applied science and associate in arts degree programs who have demonstrated ability and motivation for learning through academic achievement, work experience, and or military service.

Both New Hampshire residents and out-of-state students may be considered for admission to associate in applied science degree programs offered by the University's Thompson School of Applied Science. Candidates applying from the senior year in high school must submit the results of a College Entrance Examination Board Scholastic Assessment Test (SAT I) or results from the American College Testing program (ACT). Students granted freshman admission to the Thompson School are eligible for University residence hall accommodations.

The University offers an associate in arts degree program through the Division of Continuing Education. This program is available to both New Hampshire residents and out-of-state students. Associate in arts degree candidates are not guaranteed housing but are encouraged to contact the Department of Housing (603-862-2120) to explore possibilities.

For information concerning bachelor and associate degree programs offered through UNHM, see the section on the University of New Hampshire at Manchester (page 93).

Eligibility for Degree Candidacy

Applicants who meet the appropriate requirements for admission may become candidates for any undergraduate degree offered by the University. However, applicants having a bachelor of arts degree will not be admitted into a program of study that awards the same degree (e.g., B.A., history, and B.A., zoology). Applicants can earn more than one bachelor of science (B.S.) degree provided that each degree is in a different field. Applicants may also be admitted into a program awarding a different degree (e.g., B.A., history, and B.S., biology; or B.A., history, and A.A.S., business management).

Readmission

An undergraduate who withdraws, does not register for UNH coursework in a given semester, or is suspended or dismissed from the University thereby terminates degree candidacy and must apply for readmission by the following deadlines: fall semester, June 1; spring semester, November 1. Readmission applications are processed in the Office of Admissions. However, decisions regarding readmission are made in consultation with the Division of Student Affairs and the dean's office of the University college division to which the student is applying.

Before seeking readmission, suspended students must remain away from school for at least one semester. The applications of suspended students should include a statement about the applicant's readiness to resume University work.

Only under extraordinary circumstances will students be readmitted after dismissal for academic reasons. Applications submitted by dismissed students are reviewed by the University's Academic Standards and Advising Committee.

Students applying for readmission should realize that it may not be possible to enroll in certain programs that have established enrollment limitations.

Transfer Students

Transfer admission to UNH is competitive. The University will consider qualified candidates desiring to transfer from approved institutions. The consideration of a student's candidacy includes review of course selection and the extent to which that selection addresses the University's general education requirements. Transfer credit is awarded for courses that have been completed with a grade of C or better, provided those courses are comparable to courses offered at the University of New Hampshire. Each course must carry at least 3 credits to qualify for general education consideration. Formal transfer credit evaluations are provided upon receiving an offer of admission.

Students enrolled in one of the University's associate degree programs who desire admission to a bachelor's degree program at UNH must apply as transfer students through the Office of Admissions. A recommendation from the associate degree adviser is also required.

It may not be possible for transfer applicants to enroll in certain programs with established enrollment limitations. While University housing is not guaranteed, transfer students are encouraged to contact the Department of Housing (603-862-2120).

Students desiring to transfer for the fall semester must complete application procedures before March 1; for spring semester, by November 1.

No portion of a student's grade-point average will transfer; that is, external averages will not be calculated with UNH grades.

Transfer from Baccalaureate Program to Associate Program

A student in good standing who is enrolled in a program leading to the B.A. or B.S. degree who wishes to interrupt or terminate study short of completing requirements for a four-year degree may wish to transfer to DCE and become a candidate for the associate in arts degree. Such transfers should have at least 32 UNH credits, a grade-point average of 2.00, and no pending disciplinary action. Requests will normally be approved by the dean of the school or college in which the student is matriculated and the dean of continuing education if initiated no later than two months prior to the completion of the semester in which the associate in arts degree is to be awarded.

A student who transfers from a bachelor's program to an A.A. degree program and subsequently wishes to again become a candidate for a bachelor's degree from the University must apply for admission to the University

and will be considered as an applicant with advanced standing. Such a student will normally be admitted to a bachelor's degree program with a minimum of 64 credits of advanced standing if space is available in the specific program for which he/she has applied.

New England Regional Student Program

The University participates in the New England Regional Student Program of the New England Board of Higher Education, in which each state college and university in New England offers a number of specialized curricula at the undergraduate level to students from other New England states. Under this program, students receive some preferential admission consideration and, if admitted, pay the UNH in-state tuition plus 50 percent. Students must indicate on the application the specific approved curriculum for which they are applying. Information about the curricula may be obtained from the New England Board of Higher Education, 45 Temple Place, Boston, MA 02111, or call (617) 357-9620.

Special Student Status

UNH offers the special student classification for persons who wish to participate in University coursework without entering a degree program. Special (nonmatriculated) students register for coursework through the University's Division of Continuing Education and are usually restricted to part-time study (maximum of 11 credits) unless permission is granted by the Office of Admissions to exceed this limit. In evaluating requests for full-time status, the Office of Admissions generally applies the same criteria used in the review of applicants for admission to degree candidacy. Special students have full access to the academic counseling services of the division and should realize that their continuing participation in University coursework is predicated upon satisfactory achievement.

Resident Status

All students attending any division of the University of New Hampshire in any capacity shall be charged tuition at a rate to be determined by their domicile. Those domiciled within the state of New Hampshire shall pay the in-state rate. Those domiciled elsewhere shall pay the out-of-state rate.

Students are classified as residents or nonresidents for tuition purposes at the time of admission to the University. The decisions, made by the Office of Admissions, are based upon information furnished in students' applications and any other relevant information.

All applicants living in New Hampshire are required to submit a notarized statement to the effect that they, if financially independent, or their parents, if financially dependent, have been legally domiciled in New Hampshire continuously for a period of at least twelve months immediately prior to registering for the term for which the student is claiming in-state status. Students admitted from states other than New Hampshire or from foreign countries are considered nonresident throughout their attendance at the University unless they have acquired bona fide domicile in New Hampshire.

If students maintain residency apart from that of their parents, they must clearly establish that they are financially independent and that their residence in New Hampshire is for some purpose other than the temporary one of obtaining an education at the University. To qualify for in-state status, students must have been legally domiciled in New Hampshire continuously for a period of at least twelve months prior to registering for the term for which in-state status is claimed.

The burden of proof in all cases is upon the applicant. The University reserves the right to make the final decision concerning resident status for tuition purposes.

A copy of the rules governing tuition rates may be obtained from the Office of Admissions.

Financial Aid

The University Financial Aid Office assists promising students who are unable to meet educational expenses entirely from their own family resources. Aid is available in the form of grants and scholarships, loans, and part-time employment. The financial aid catalog, *Scholarships and Grants*, contains a listing of scholarships available from endowments, special programs, and gifts. The financial aid brochure gives program information, application procedures, and deadlines.

In many communities, scholarships and loans are available locally. School principals and guidance counselors have information about these sources of assistance, which are available to both high school seniors and adult students.

Before applicants may be considered for assistance by the University, they must submit the Free Application for Federal Student Aid (FAFSA). Applicants may obtain the FAFSA from local high schools or from the UNH Financial Aid Office.

The financial aid application deadline for the 1995–96 academic year for aid awarded by the University is March 1, 1995. This is the date by which your *fully completed* FAFSA must be received by the federal processor.

The importance of meeting this deadline cannot be overstated. While there are some types of aid (e.g., Pell Grants and Stafford Loans) for which you may apply after this deadline, it is likely that you will receive substantially less total aid if your application is late. For the past several years, applicants applying after the deadline did not receive any aid awarded by UNH (SEOG, tuition grant, Perkins Loan, or work study).

It is the University's position that the student applicant is accountable for the accuracy and timely submission of the FAFSA. We realize that in most cases a student's parent(s) also participates in completing the form. However, we invest in the student's ultimate responsibility for monitoring the application process. Students should not wait until being admitted to the University before applying for financial aid.

Note: There is reference on the FAFSA to a "deadline" of May 1, 1996. Do not be misled by this date. This is simply the last date on which the federal processor will accept the form. It is *not* the financial aid deadline at UNH or most other colleges.

Grants and Scholarships

Admitted undergraduate degree candidates who will attend UNH on a full- or part-time basis may be considered for tuition grants and University scholarships. The basic consideration is

financial need, although some scholarships are awarded on the basis of scholastic attainment, participation in extracurricular activities, or meeting specific requirements of a donor.

The University participates in the federally sponsored Federal Supplemental Educational Opportunity Grant Program, which is designed to assist needy students who are admitted degree candidates.

Federal Pell Grant Program

Students may apply directly to the federal government for a Pell Grant using the FAFSA. Students must reapply each year for a grant.

Loan Programs

Two loan funds are administered by the University: UNH Loan Fund and Federal Perkins Loans (formerly NDSLs). Admitted undergraduate and graduate degree candidates who will attend the University on at least a half-time basis may be considered for these loans. Financial need must be clearly demonstrated, and loans may be used only for educational expenses.

Most states now have higher education loan plans established by the Higher Education Act of 1965. Contact your local bank, other lender, or the Financial Aid Office for information.

Part-Time Employment

The Federal Work-Study Program, both academic year and summer, assists students who, as determined by the Financial Aid Office, need financial assistance for their educational expenses. Admitted undergraduate and graduate degree candidates attending at least half time are eligible for consideration.

Students who do not qualify for the Work-Study Program may find part-time employment on or near campus.

ROTC Scholarships

ROTC scholarships are offered on a competitive basis by both the Army and Air Force. Entering freshmen may compete for four-year scholarships during the last year of high school. Students in both the four-year ROTC program and the two-year program compete for scholarships covering their remaining academic years. Scholarships pay for full tuition, all mandatory University fees, and required textbooks for all courses. Limits may be placed on these scholarships depending on the type and amount of expenses incurred. In addition, all scholarship recipients receive a tax-free $100-per-month subsistence allowance.

Services for Students

Housing

The University offers students a variety of housing options, including the mini-dorms (devoted to special-interest themes), Smith Hall (international student housing), small halls of approximately 100 students, medium halls, and large halls (ranging from 400 to 600 students). Some halls are single sex; others are coeducational. Upperclass undergraduates may also choose from either of the two on-campus apartment complexes: the Gables and Woodside Apartments are designed to meet the more independent and self-reliant life-styles of upperclass students. Graduate and family housing are also available on campus.

The Department of Housing and the Residential Life Office are committed to providing a living environment that maintains high standards of health and safety. Full-time professional directors manage the residence halls and work with a student staff to offer special programs and enforce hall standards.

Undergraduate University housing is available to all full-time degree candidates; offers of housing to associate in arts degree and Division of Continuing Education students are made on a case-by-case basis. Students are not required to live on campus.

Offers for on-campus housing are sent to all accepted new freshmen. Transfer and readmitted students may apply for housing upon admission to the University. Offers will be made on a space-available basis. All application materials are available at the Department of Housing located in Pettee House.

The University reserves the right to adjust room and board charges and policies when necessary; however, such adjustments will be announced as far in advance as possible. For more information, contact the Department of Housing (603-862-2120).

Dining

Undergraduate students living in traditional residence halls choose from a 19- or 13-meal (weekly) dining plan. Meals are ample and varied and can be taken in any of three dining halls. Because dining hall menus are planned by a nutritionist, even the needs of students with restricted diets normally can be met. Students with severe diet restrictions should contact UNH Dining (603-862-2583). Those whose special needs cannot be met by dining hall menus or who prefer to prepare their own meals are advised to seek accommodations with good preparation facilities in undergraduate apartments or off campus. Off-campus students may purchase a 19-, 13-, or 7-meal plan, a 5-lunch plan, a 35-meal plan, or Cat's Cache (a prepaid food purchase account). Cat's Cache enables the convenient purchase of foods and late-night snacks in dining halls, the MUB, and Gables convenience store and may be used in conjunction with another dining plan. For more information, contact the UNH Dining Office (603-862-1821).

Memorial Union

The Memorial Union, New Hampshire's state war memorial, is the University's community center. It serves as the focus for student programs and provides services for the entire University community. Students, faculty, and staff on the Memorial Union governing board work with the director to set policies for the building's operation and those student activities related to the building. Building services include the University Information Center and Ticket Office; the Cat's Closet, a convenience store; the Coffee Office, serving fresh bakery items, coffee, and cappuccino; Wild Cards, offering greeting cards, balloons, flowers, and photo processing; and a computer center housing Project DISCovery. The games area has video and pinball machines and billiard tables. The Commuter/Transfer Center, ACCESS office, student government offices, and various other student organizations are also located in the Memorial Union.

University Health Services

The University Health Services provide comprehensive primary health

care, including laboratory examinations, x rays, pharmacy services, and limited physical therapy. Both inpatient and outpatient care are available. The staff maintains close relationships with other specialists in the area to whom they may refer patients for surgical or subspecialist care. Three well-staffed and -equipped community hospitals are nearby, and emergency ambulance service is available in Durham at all times.

During the regular academic year, University Health Services is staffed by seven full-time board-certified physicians (three specialists in adolescent medicine, two internists, one gynecologist, and one family practitioner), physician assistants, nurse practitioners, nurses, and part-time consultants. Appointments with physicians, physician assistants, and nurse practitioners may be made upon request. An appointment is not necessary for medical problems requiring immediate attention; such cases are treated through the outpatient clinic on a walk-in basis.

Office of Health Education and Promotion

The Office of Health Education and Promotion provides confidential counseling and referrals and offers health workshops. Its resource room contains information on physical and emotional health issues, including HIV/AIDS, alcohol, smoking, women's health, birth control, heart disease, sexuality, eating disorders, and stress management. These services and programs reflect the University's commitment to promoting awareness of such problems, encouraging responsible behavior and informed decision making, and helping students develop self-esteem. Students may drop in and arrange for an appointment or call the office at (603) 862-3823.

Health Fees

A mandatory health fee is assessed of all undergraduate and graduate degree candidates and all full-time non-degree candidates. The academic year 1993–1994 health fee was $280. Payment of the fee entitles the student to unlimited visits to Health Services physicians, physician assistants, and clinic nurses; when ordered by a Health Services practitioner, unlimited routine x rays and laboratory procedures performed at Health Services; the first $50 of off-campus laboratory work when it is ordered and the specimen is collected by a Health Services staff member for transmittal to the Health Services laboratory contractor; health education visits; medicines for treatment of acute illnesses and injuries if the medicine is stocked in the Health Services pharmacy; family planning services; and one physical examination except for routine exams without specific purposes.

Services not included under the health fee are medicines for treatment of chronic illness; consultant visits at the health center; x rays performed outside of the Health Services Center; off-campus laboratory tests performed in any other laboratory (Wentworth-Douglass Hospital, Leary Lab, etc.); contraceptive devices or medicines; orthopedic appliances or casts; and emergency room visits ordered by the Health Services staff.

An optional student health insurance policy is available through Health Services. Its cost for a full year in 1993–1994 was $522. It covers most health care needs not covered by the health fee, including major medical payments. It is specifically designed to work in conjunction with the student health fee and may supplement or replace other insurance. Pre-existing conditions may not be covered. The maximum benefit is $500,000 lifetime benefit per accident or illness. It is underwritten by Blue Cross-Blue Shield of Virginia and is jointly administered by Blue Cross-Blue Shield of New Hampshire and Blue Cross-Blue Shield of Virginia.

Health Record Requirement

In order to provide effective health service, the University requires that students who have been formally accepted for bachelor's or associate degree candidacy and who register for 6 or more credits must have complete medical records on file with University Health Services. These records consist of (1) a health history to be completed by students before registration on a form provided by the University Health Services, (2) proof of immunity to measles, and (3) documentation of tuberculosis (TB) testing within one year prior to entrance to UNH. This is mandatory for registration. *STUDENTS MUST HAVE HAD TWO LIVE-VIRUS MEASLES VACCINATIONS AFTER 12 MONTHS OF AGE.* International students must have been tested for TB within four weeks of arrival in the United States. Proof of date tested and test results must be submitted to Health Services. Students wishing exemption from this requirement on religious grounds must make a written request to the director of University Health Services. It is the responsibility of students to complete the forms before the beginning of classes. Any student failing to complete these requirements will not be allowed to register for classes.

Student Activities and Organizations

The Memorial Union and Student Activities Office serve as the center for student organizations and related activities. They provide a wide variety of services and outreach programs for the entire University community.

Students participate in approximately 120 recognized organizations, each with special interests, which include academics, politics, religion, career, volunteer service, and social fraternities and sororities. Staff support is available to students in developing a new organization, accessing on-campus services, producing publicity, and sponsoring programs and activities. The Student Activities Office also sponsors the Emerging Leader Program.

A student activities fee, determined by the Student Senate, provides funds for *The New Hampshire* (the student newspaper); WUNH-FM (student radio station); the *Granite* (the UNH yearbook); Student Senate; the Programming Fund Office (PFO); Student Press; Cool-Aid (campus crisis referral service); the Diversity Support Coalition (DSC); Safe Rides; the Women's Issues Resource Center; and three programming organizations: the Memorial Union Student Organization (MUSO), the Campus Activities Board (CAB), and the Student Committee on Popular Entertainment (SCOPE). Additional funds are available to other organizations for special programs through the PFO. The Student Senate, through the Student Life Council, has developed the Programming Council, which brings together representatives from all the programming organizations to facilitate future planning and cooperation so as to better serve the needs of the student body.

Other special events on campus include Family Weekend (sponsored by

the UNH Parents Association), Homecoming, Winter Carnival, Spring Weekend, "Late Night at UNH" dances, and "Casino Nights" (sponsored by CAB).

Cultural Events

Students at the University can participate in a rich cultural life. In addition to the numerous lectures, films, concerts, and University theatrical productions offered throughout the year, the UNH Celebrity Series brings artists of international stature to campus. The performing arts at UNH are an important part of undergraduate education, and programs are frequently incorporated into classwork.

Judicial Programs

The Judicial Programs Office administers on-campus judicial affairs under the guidelines of the student conduct system and University grievance policy and upholds community standards. These systems are designed to protect the rights of students, faculty, or staff accused of violating the University policies, as detailed in the *Student Handbook*.

Career Services

Career Services assists students at every step of their careers—from identifying potential careers for the undecided, to offering opportunities to explore career possibilities, to actually securing employment. Interest testing, computer-aided career decision making, and career planning workshops are designed for the undecided. A career library, a parent/alumni career advisers network, and an internship/field experience office help students explore career possibilities. Job placement opportunities are offered through an on-campus recruiting program, regular publication of received job notices, and several computer-assisted placement programs. An annual career day, graduate school fair, and summer job fair also help in career planning. The office also administers national tests for postgraduate schooling. The service is available to all undergraduates and graduate students; early use is encouraged.

Job Locator Program

As part of the Career Services opportunities available, the federally funded Job Locator Program helps students locate part-time and summer jobs, preprofessional internships (also called field experiences), and community service jobs. All three types of positions are posted on the job board in the Memorial Union Building, are listed in Wildcat, and are maintained in binders in the Career Services office.

Internships can take place anywhere: in a business, a research facility, a wildlife refuge, and so on. Internships can last from one to several months, be full or part time, and be paid or unpaid. Students engaged in career-oriented work experiences may earn academic credit.

The community service program locates positions in not-for-profit service agencies for work study students. These positions are designed to encourage students to assist in community agencies and programs involved with improving living conditions, especially for residents who may be termed disadvantaged.

Students who wish to participate in the Job Locator Program need only consult the job listings and apply. Those interested in internships or the community service/work study program should contact Career Services (603-862-2010).

Office of Multicultural Student Affairs

The mission of the Office of Multicultural Student Affairs is twofold: (1) to assist students, student groups, and University offices in providing services to students of color in order to increase their retention and graduation rates, and (2) to support and assist students and student groups that contribute to making the University a diverse, multicultural community.

In pursuit of this dual mission, the Office of Multicultural Student Affairs assists the University in the retention and graduation of African-American, American Indian, Asian-American/Pacific Islander, and Hispanic/Latino student populations. The office is also dedicated to fostering the full participation of these student populations in all facets of the UNH community and ensuring that they have access to all academic, social, and recreational groups and activities. The office seeks to make a "difference that makes a difference."

The office focuses on the value of multiculturalism to the campus community; promotes diversity, integration, and interaction through both structured programs and informal opportunities for dialogue; and contributes to campuswide multicultural programs.

The office acts as a University liaison to student organizations such as A.D.E.L.A. (Asociación de Estudiantes Latinos Americanos), Black Student Union, Hillel, the Gay/Lesbian/Bisexual Student Alliance, and the Native American Cultural Association.

International Student Office

The International Student Office (ISO) of the Center for International Perspectives provides counseling, programming, and administrative support to international students and serves as a general resource and referral center. The ISO is responsible for the reception and orientation of new international students and provides assistance concerning immigration matters. All new international students are required to report to the ISO within fifteen days of their arrival at UNH. Students are also required to maintain contact with the ISO and must report any change of visa status, address, academic program, or source of educational funds.

Advising and Counseling Services

Every UNH student is assigned an academic adviser, who provides help in choosing courses and planning a program of study. Each college within the University also has an advising office. Other sources of help, for academic or personal problems, are described below.

University Advising Center

The University Advising Center (Hood House, 603-862-2064) provides academic advising for undeclared students and selected majors in the College of Liberal Arts. The advising center has four full-time advisers and a director to assist students with program selection. Students are encouraged to use their period of undeclared status to explore areas of study that will help them select a major.

The advising center coordinates the services of part-time faculty advisers representing each of the five schools and colleges on campus. Each faculty member, available for appointments at the center, can give students the most

current information on specific majors and departmental requirements.

Counseling Center

The Counseling Center offers professional consultation, individual and group therapy, and educational workshops for a broad range of emotional, psychological, and interpersonal problems. The center offers services without charge to full-time degree students who may be facing a major crisis, confusion, depression, family difficulties, or other personal problems.

The center provides a scheduled intake system. In addition, the senior staff provides psychological emergency consultation to Health Services twenty-four hours a day, seven days a week during the regular academic year. When necessary, the center's staff assists with outside mental health referrals.

The staff, which includes certified licensed psychologists and counselors, is committed to the welfare and development of UNH students. The center sponsors a variety of student-oriented activities including personal skills groups on such topics as assertive communication, stress management, and eating/body image concerns. The staff is available for consultation with faculty, administrative staff, and parents on matters relating to the welfare of students.

All information about a student's visits to the Counseling Center is confidential and cannot be released without the permission of the student. For information, call (603) 862-2090.

Training in Academic Skills (TASk) Center

The Training in Academic Skills (TASk) Center offers a comprehensive program of academic-related services to all undergraduate students. Participants work on an individual basis or in group seminars with trained staff members to improve their academic performance and enhance their educational experience. TASk offers learning skills instruction, reading assessment, study groups, computer support, course information, clarification of academic goals, personal advising, and referral.

Additional services are available through the Student Support Services component of TASk for students who meet income and disability criteria. These services include subject-area tutoring, individualized reading and writing instruction, graduate school advising and preparation, and scholarship search assistance.

Located at Wolff House (8 Ballard Street, next to Health Services), the TASk Center is open Monday, Tuesday, and Wednesday from 8:00 A.M. to 8:00 P.M. and on Thursday and Friday from 8:00 A.M. to 4:30 P.M. Call (603) 862-3698 for further information.

Other Services

ACCESS Office

Students with a physical or mental disability that limits one or more major life activities, such as walking, seeing, hearing, speaking, working, or learning, are encouraged to inform the ACCESS Office (Accessing Career Challenges in Education through Specialized Services) of the enabling accommodations they require (Room 200, Memorial Union Building, 603-862-2607 voice/TTD).

The University encourages members of the community with disabilities to use existing services and to become involved in the mainstream of campus life. Inquire through the ACCESS Office for information about priority scheduling, accessible classrooms, special parking arrangements, assistance in securing academic aides, accessible on-campus transportation, reading services, interpreters, and other special arrangements.

Commuter/Transfer Center

The Commuter/Transfer Center, located in the Memorial Union, assists commuter and transfer students with off-campus living. The staff will answer questions about renting, area landlords, consumer issues, and other commuter-related problems. Lists of available rental houses, apartments, rooms, and names of people looking for roommates are published weekly.

Other services include orientation activities, emergency housing, roommate file box, the housing/work exchange program, a ride board, babysitting pool for student parents, intramural sign-ups and information, and commuter adviser program. Typewriters, calculators, a microwave, a refrigerator, jumper cables, and dictionaries are available for student use.

Nontraditional Student Services

Nontraditional Student Services (603-862-0113) offers programs and services to students returning to college after a number of years out of school. The Nontraditional Student Organization (NTSO) maintains an office at the Commuter/Transfer Center (see services listed above). The NTSO meets on a regular basis, offers support groups and workshops, and advocates for nontraditional student concerns. Students are encouraged to stop in for information, to study, or to visit with other students.

Child Care Resource and Referral Service

Information about Seacoast area child care and assistance selecting appropriate care are available through the UNH Child Care Resource and Referral Service (603-862-2895). The University also operates on-campus day care and preschool programs. Call (603) 862-2835 for further information.

SHARPP

The Sexual Harassment and Rape Prevention Program (SHARPP) is dedicated to providing a safe environment for all members of the University community. SHARPP operates a twenty-four-hour hotline to respond to the needs of survivors of sexual assault and their significant others. The hotline is monitored at all times by two victim advocates who are trained in accordance with the New Hampshire state statute that protects confidential communication between counselor and victim. Sexual assault advocates are trained volunteer women and men who offer confidential assistance to students who have been sexually assaulted. These advocates will accompany the survivor through the criminal justice system, medical procedures, police reports, and student conduct proceedings. SHARPP offers peer support groups for adult survivors, incest and child sexual assault survivors, significant others, and parents. All of SHARPP services are free and confidential.

SHARPP also provides campuswide rape awareness workshops and sexual harassment workshops for residence halls, academic classes, fraternities and sororities, athletic teams, and faculty/staff/student organizations.

You can reach a SHARPP advocate by dialing (603) 862-1212. You simply need to give your first name and your phone number and a SHARPP advocate will return your call immediately. You may also reach the SHARPP office Monday through Friday, 8:00 A.M. through 4:30 P.M., at (603) 862-3494.

Women's Commission

The President's Commission on the Status of Women was established to explore conditions and attitudes within UNH relating to the mobility and functional equality of women and to encourage movement toward the goal of full participation of women. The commission recommends policies to the president and other University administrators to improve the status of women and to ensure an environment of equal educational and employment opportunities, networking opportunities, information, and support to all women on campus. The commission is located in Batcheller House on Rosemary Lane. The office is open Monday through Friday, 8:00 A.M. to 4:30 P.M. (603-862-1058).

Veterans' Information

The UNH veterans' coordinator, located in the Registrar's Office (603-862-1595), provides counseling on all aspects of veterans' benefits as well as assistance in procuring and completing the required forms and certifications for veterans' benefits. The veterans' coordinator maintains a comprehensive directory to assist veterans in contacting state, local, and University resources for housing, day care, career planning, employment, financial aid, tutorial assistance, remedial training, handicapped services, and Vietnam Veterans' Outreach. The coordinator also provides a framework for networking among campus veterans.

Wildcat

The Wildcat campuswide information system, with computer terminals located conveniently around campus (in the MUB, library, Field House, Elliott Alumni Center, Thompson Hall, and elsewhere), gives the University community quick and easy access to information about the University—daily events, clubs, activities, athletics, employment listings, off-campus housing, University policies, important phone numbers, and more. Wildcat is updated daily through Computing and Information Services. Call (603) 862-3228 for information.

Fees and Expenses

The cost for the freshman year at the University averages about $10,589 for residents of New Hampshire and about $18,219 for nonresidents. See the chart below for a breakdown of these costs.

Fees and Expenses (1993–1994)*

	N.H. Residents	Non-residents
Tuition	$3,550	$11,180
Room (average)	2,214	2,214
Board (19 meals/wk.)	1,648	1,648
Activity fee	65	65
Recreational fee	49	49
Memorial Union fee	122	122
Student Athletic fee	310	310
Health fee	284	284
Books, class supplies	500	500
Total	$8,742	$16,372
Individual expenses	$1,300	$1,300
Health insurance (optional)	522	522
Parents Association	25	25

*The University reserves the right to adjust charges for such items as tuition, board, student fees, and room rent. Such changes will be announced as far in advance as feasible.

Tuition

Tuition is $3,550 ($11,180 for nonresidents) per academic year. Undergraduates registering for 12 credits or more per semester pay the full tuition.

Students are permitted to enroll for more than 20 credits only with the approval of their college or school dean. After midsemester, persons carrying more than 20 credits will be billed a per-credit fee of $148 for each credit above 20 for resident students and $466 for nonresident students, whether or not a student has obtained the dean's approval. (No refund will be made if a student subsequently drops a course, bringing the credits to 20 or fewer.) Resident undergraduates registering for fewer than 12 credits pay $148 per credit hour, plus a registration fee of $15 per semester. Nonresident undergraduates registering for fewer than 12 credits pay $466 per credit hour, plus a registration fee of $15 per semester. The minimum charge for any recorded course is $148 for residents and $466 for nonresidents.

Tuition differential charges apply to some majors. Students majoring in engineering (chemical, civil, electrical, mechanical) and computer science will be charged a tuition differential of $175 for both resident and nonresident students per academic year. Students in these programs (both resident and nonresident) who register for fewer than 12 credits pay a differential tuition of $5 per credit hour. Whittemore School majors are subject to a tuition differential surcharge of $300 for both resident and nonresident students per academic year.

All admitted students must pay an enrollment fee—$300 for residents and nonresidents. The enrollment fee, less $100 (to cover new student services such as orientation, preregistration, and record preparation), will be credited to the tuition bill. If a student decides not to attend the University, these payments may be refunded on a prorated basis until August 15, according to the guidelines set by the Office of Admissions.

Three-fourths of tuition charges will be refunded to students withdrawing or dropping courses within one week of registration; one-half after one week and within thirty days; and none thereafter (see the University Calendar). NOTE: The refund policy is currently under review by the Board of Trustees and is therefore subject to change. A degree candidate who withdraws from UNH and subsequently enrolls as a special student within the following year will be billed for tuition and fees on the same basis as degree candidates. Students with outstanding financial obligations to the University must clear their accounts before their registration will be confirmed.

A $25 fee must be paid by all students dropping courses after the third Friday of classes. The $25 fee will not be charged to persons changing to a reduced load or withdrawing; in both of these cases, the regular tuition rebate policy will apply. If a student has received permission to add a course after the third Friday of classes, a $25 fee will be assessed for each course added. A change of section within the same course is accomplished by a

"drop" of one section and an "add" of another; however, only one $25 fee is assessed under these circumstances.

Fees

Required fees for 1993–94 included a Memorial Union fee ($122) for the use and administration of the student union; a recreational fee ($49) for the use of recreational facilities; a student activity fee ($65) for support of the undergraduate newspaper, yearbook, student government, student lawyer, student radio station, and other student organizations; a student athletic fee ($310) to provide support for athletic programs; and a health fee ($284) to provide general health care through University Health Services.

There are no waivers or refunds of these fees. The services and facilities are available to all—the extent to which each student uses them cannot be the factor by which assessment is determined.

Participants in intercollegiate athletics are required to purchase the student accident and sickness insurance or demonstrate proof of comparable insurance to the respective athletic department. The 1993–94 cost for student accident and sickness insurance was $522 for a full calendar year.

An optional $25 fee may be included for participation in the Parents Association.

Room and Board

Room and board charges average $3,760 per academic year for a double room with a 13-meal-per-week plan.

Students accepting a space on campus must include a $200 housing deposit with a signed Room and Board Agreement. Written notification of cancellation of the room application or assignment received before August 15 will result in forfeiture of the deposit only. Written notification of cancellation after August 15 and before Friday of the first week of class will result in a charge of one-fourth of the full semester's housing fee.

If the student fails to occupy the assigned room by Friday of the first week of class or cancels the agreement by mutual consent, or if for disciplinary or nonrenewal actions the agreement is cancelled, the student receives a 75 percent refund of the semester's housing fee. Cancellation after the first Friday of classes and before thirty days after registration will result in a 50 percent refund of the semester's housing fee. Cancellation thirty days after registration will result in no refund of the housing fee. Students who check in or move in to a hall or apartment, move out, and do not withdraw from the University, are charged the full housing fee. If the agreement is cancelled, the total amount of the housing deposit will be applied against any unpaid University charges.

Refunds on board plans will be granted only on approved waivers or withdrawal from the University. Cancellation of a meal plan before registration day will result in a 100 percent refund; after registration day but before the end of the first week of the semester, 75 percent refund; and after the end of the first week but before the end of the fourth week, 50 percent refund. Refunds after the fourth week through the end of the twelfth week will be based on the remaining food cost portion of the meal plan. No refunds will be made after the end of the twelfth week. Generally, rebates will not be allowed for missed meals except in the case of illness.

Rebates

Any amount owed to the University will be deducted from any rebate due to a student.

Deposits and Course Fees

Refundable deposits may be required to cover locker keys or loss or breakage in certain departments. A charge will be made for individual lessons in music, as noted in the description of applied music courses. A charge will be made for riding lessons and scuba, as noted in the sections on animal sciences and physical education. Some courses carry special fees to cover the costs of special equipment, field trips, etc.; these are noted in the course descriptions. Thompson School students pay curriculum fees to cover special costs in their programs (see the Thompson School catalog). Students will be charged a computer use fee for courses requiring computer access and/or common access accounts. For certain courses, there are also lab fees.

Other Expenses

Books and classroom supplies cost approximately $500. These may be purchased at the University Bookstore.

Personal expenses average $1,300. These vary with individual students and include clothing, laundry, recreation, incidentals, and travel.

Payment

All bills, including those for room and board in University buildings, are due and payable in full on the payment due date for each semester. A late payment fee will be assessed to all accounts unpaid by the payment due date set for each semester.

Parents and students who wish to make periodic payments should consult their local banks, other financial institutions, or the University's Business Office for assistance in locating firms that provide programs for budgeting educational expenses.

University Academic Requirements

To graduate from the University of New Hampshire, students must fulfill three types of requirements: University (general education), degree, and major requirements.

In addition to the particular requirements for specific degrees and majors, all candidates for a bachelor's degree must obtain a passing grade in a minimum of 128 credits in courses numbered 400–799, must maintain a cumulative grade-point average of at least 2.00 for all courses taken at the University in which a grade is given, and must successfully meet, as soon as possible in their University careers, the general education requirements described below.

General Education Program

The general education program is designed to emphasize the acquisition and improvement of those fundamental skills essential to advanced college work, especially the abilities to think critically, to read with discernment, to write effectively, and to understand quantitative data. It aims to acquaint the student with some of the major modes of thought necessary to understanding oneself, others, and the environment. It seeks to develop a critical appreciation of both the value and the limitations of significant methods of inquiry and analysis. Its goal, moreover, is the student's achievement of at least the minimal level of literacy in mathematics, in science and technology, in historical perspectives and the comprehension of our own and other cultures, in aesthetic sensibility, and in the diverse approaches of the humanities and the social sciences to understanding the human condition.

General education is intended to serve as a foundation for any major. It aims to go beyond the mastery of job-related skills and educate students so that they learn how to learn. The program is based on the premise that change is the dominant characteristic of our times and that the truly useful education stresses intellectual adaptability and the development of those problem-solving abilities, cognitive skills, and learning techniques vital to lifelong learning.

General Education Requirements

Students must fulfill the following general education requirements:

1. one course in writing skills, which must be taken during a student's first year;
2. one course in quantitative reasoning, which must be taken during a student's first year;
3. three courses in biological science, physical science, or technology, with no more than two courses in any one area;
4. one course in historical perspectives;
5. one course in foreign culture (may also be satisfied by approved study abroad programs);
6. one course in fine arts;
7. one course in social science; and
8. one course in works of philosophy, literature, and ideas.

General education requirements shall not be waived on the basis of special examinations or placement tests, except for the College Board Advanced Placement tests and the College Level Examination Program (CLEP) tests. The required courses cannot be taken on a pass/fail basis. No single course may be counted in more than one general education category. Academic departments may or may not permit general education courses to count toward requirements for a major. Each course must carry at least 3 credits to qualify for general education consideration.

The specific courses that fulfill each category of the general education requirements are printed below. Any course appearing in this list will fulfill a general education requirement if taken after August 31, 1994.

1. Writing Skills
ENGL 401

2. Quantitative Reasoning
ADM 430‡
CS 410C, 410F, 412
DS 420
HHS 540
INCO 404B*
MATH 419, 420, 424, 425
PHIL 412, 550
PSYC 402
RECO 528
SOC 502

3. Biological Science, Physical Science, and Technology

Biological Science
ANSC 400, 401
BIOL 405‡, 406‡, 411, 412, 413‡, 414‡, 443‡, 445‡
ENTO 400, 402
HMP 501
INCO 404C*
MICR 501
PBIO 400, 412, 421, 503, 535
PHED 607
SOIL 502
WILD 433
ZOOL 402, 412, 474, 507, 508

Physical Science
CHEM 401, 402, 403, 404, 405, 409
ESCI 401, 402, 409, 450, 501
INCO 404D*
PHYS 401, 402, 406, 407, 408
SOIL 501
WARM 504

Technology
CIE 520
CIS 411‡
CS 401, 406
EC 635
ESCI 405
FOR 502
INCO 404E*
PHIL 447, 450
TECH 583

4. Historical Perspectives
ENGL 515
HMP 510
HIST 405, 406, 410, 421, 422, 435, 436, 497, 523
HUMA 510C†, 511C†, 512C†, 513C†
INCO 404F*, 404G*
PHED 561
POLT 403, 508

5. Foreign Culture
ANTH 411, 500, 512, 515, 519
CHIN 503, 504
ENGL 581
FREN 425, 503, 504, 525, 526
GEOG 401, 402
GERM 503, 504, 523, 525
GREK 503, 504
HIST 425, 563
INCO 404H*, 404J*, 404K*
INTR 438‡
ITAL 503, 504
JPN 503, 504
LATN 503, 504
POLT 557
PORT 503, 504
RUSS 425, 503, 504
SPAN 503, 504, 525, 526

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* Available only to honors program students and others who have obtained special permission.

** Students may take either HUMA 480A or 480B but not both

† For students who complete the entire sequence of HUMA 510, 511, 512, and 513, corolling in different discussion sections each time, a fifth general education requirement (in foreign culture) will be waived, although additinnal credit hours will not be granted.

‡ Offered only at UNHM (Manchester).

6. Fine Arts
ARTS 431, 487, 532, 570, 571, 572, 573, 574
DANC 441, 461, 462, 463, 487
HUMA 480A**, 510A†, 511A†, 512A†, 513A†
INCO 404L*, 404M*, 404N*, 480
MUSI 401, 402, 501, 502, 511
PHIL 421
THEA 435, 436, 438, 441, 450, 457, 459, 546, 548, 551, 583

7. Social Science
ANSC 405
ANTH 412, 518, 625
CD 415
CMN 402, 455, 457
ECN 411‡, 412‡
ECON 401, 402
EDUC 410
ENGL 505
FS 525
GEOG 581, 582
HMP 401
HUMA 510D†, 511D†, 512D†, 513D†
INCO 401, 402, 404O*, 404P*, 404R*, 404S*
LING 505
NURS 670
NUTR 405
PHED 560
POLT 402, 560
PSYC 401
RECO 411
RMP 570
SW 525
SOC 400, 500, 520, 530, 540
WS 401

8. Works of Literature, Philosophy, and Ideas
AMST 501,502
CLAS 501, 511, 512
CMN 456
ENGL 511, 513, 514, 516, 517, 518, 519, 521, 522, 523, 533, 585, 586, 631, 632, 657, 685
FREN 621, 651, 652
GERM 520, 521
HUMA 401, 480B**, 501, 502, 503, 510B†, 511B†, 512B†, 513B†, 519‡, 650, 651
INCO 404T*, 404U*, 404W*, 404Y*, 450
ITAL 621, 622
PHIL 401, 417, 424, 435, 436, 520, 530, 570, 574, 600, 630, 660
POLT 401, 521
PSYC 571
RS 416, 417
RUSS 521, 522, 593
SPAN 621, 622, 650, 651, 652, 653, 654

Grades

Instructors assign grades as listed below; grade points per credit are indicated in parentheses. For all undergraduate courses, grading standards established by the Academic Senate are that a C indicates competent, acceptable performance and learning; B indicates superior performance and learning; and A indicates excellent performance and learning. These standards apply to all undergraduate courses, instructors, departments, subjects, and colleges. The University reserves the right to modify grading and honors practices.

A	(4.00)	Excellent
A–	(3.67)	Intermediate grade
B+	(3.33)	Intermediate grade
B	(3.00)	Superior
B–	(2.67)	Intermediate grade
C+	(2.33)	Intermediate grade
C	(2.00)	Satisfactory, competent
C–	(1.67)	Intermediate grade
D+	(1.33)	Intermediate grade
D	(1.00)	Marginal grade
D–	(0.67)	Intermediate grade
F	(0.00)	Failure: academic performance so deficient in quality as to be unacceptable for credit
AF	(0.00)	Administrative F (usually indicates student stopped attending without dropping the course); is included in grade-point average
CR		Credit: given in specific courses having no letter grades, designated credit/fail
P		Passing grade in a course taken under the student pass/fail grading alternative
W		Withdrawal—assigned if withdrawal is later than fifth Friday of classes; is not included in grade-point average
WP		Withdrawal—assigned if withdrawal is after midsemester and if student is passing; is not included in grade-point average
WF		Withdrawal—assigned if withdrawal is after midsemester and if student is failing; is included in grade-point average
AU		Audit—no credit earned
IC		Grade report notation for student's incomplete coursework
IA		Indicates "incomplete" in a thesis or continuing course of more than one semester; the grade earned will replace "IA" assigned in previous semesters
IX		Grade not reported by instructor

Students earning a semester or cumulative grade-point average less than 2.00 are placed on "academic warning."

Pass/Fail

While earning a bachelor's degree, students may choose the pass/fail grading alternative for a maximum of 4 credits per semester up to a total of 16 credits toward the degree.

Pass/fail cannot be used for general education requirements, for courses required by a student's major or second major, for option or minor requirements, for ENGL 401, or for repeated courses. In addition, B.A., B.F.A., and B.M. degree candidates may not use pass/fail for courses taken to meet the foreign language requirement, and no Whittemore School course may be taken on a pass/fail basis by a student majoring in administration, economics, or hotel administration.

The minimum passing grade for credit is a D– (0.67); any grade below this minimum is a fail. All grades will be recorded on the grade roster as A, B, C, D, F, or intermediate grades. The pass/fail marks will be placed on students' transcripts and grade reports by the Registrar's Office. The course will not be included in the grade-point calculation, but the pass or fail will be recorded, and in the case of a pass, the course credits will be counted toward degree requirements.

Associate in arts students, see page 16.

Honors

An undergraduate degree student, after completion of at least 12 graded credits in University of New Hampshire courses, is designated as an honor student for a given semester if the student has (a) completed at least 12 graded credits for that semester and earned at least a 3.20 semester grade-point average; or (b) earned at least a 3.20 cumulative grade-point average and at least a 3.20 semester grade-point average regardless of the number of graded credits that semester. These categories are used: 3.20 to 3.49 (honors); 3.50 to 3.69 (high honors); and 3.70 to 4.00 (highest honors).

Bachelor's degree candidates who have earned honors for their entire work at the University will be graduated with honors based on the final cumulative grade-point average, provided that a minimum of 64 graded credits have been completed in University of New Hampshire courses. The Latin equivalent of the honors classification will appear on the student's academic record and diploma. The student's honors classification will be noted in the commencement program.

Degree Requirements

Grading and honors policies as stated in this catalog apply to all undergraduate students.

Other requirements in this catalog apply to students who enter the University between July 1, 1994, and June 30, 1995. (Students who entered the University at an earlier time but who wish to change to the requirements of this catalog must apply to the appropriate office for the change.) Students will be held responsible for all work required for graduation and for the scheduling of all necessary courses. Students are each provided one free copy of the catalog that is in effect at the time of their entry to the University. They are expected to keep that copy for the duration of their time at the University. Any other copies must be purchased, and availability cannot be guaranteed.

Modifications tend to occur in major programs during the four-year period of students' undergraduate careers. Students are expected to conform to these changes insofar as they do not represent substantive alterations in their course of study.

Note: Although the University will try to provide sufficient facilities so that students may pursue any major or curriculum for which they meet the requirements, such a privilege cannot be guaranteed, since rapidly increasing enrollment sometimes results in the overcrowding of required specialized courses. On occasion, students may remain in a crowded curriculum if they are willing to take certain courses during the summer session.

Bachelor of Arts

1. At least 128 credits with a minimum cumulative grade-point average of 2.00 in all University of New Hampshire courses.

2. Completion of the University general education requirements. This is intended to ensure that all students receiving the bachelor of arts degree acquire reasonable exposure to and learning in the arts and humanities, social sciences, and natural sciences.

3. Proficiency in a foreign language at the level achieved by satisfactory work in a one-year, college-level course. This requirement may be fulfilled by achieving a score of 500 or better on a College Board foreign language achievement test, or by completing a full-year elementary course in any foreign language, or by completing a semester of a course in a foreign language beyond the elementary year, or by completing a one-year college-level course in American Sign Language. This requirement must be satisfied by the end of the sophomore year.

4. Satisfaction of major requirements by completing at least 32 credits of major coursework with grades of C– or better and a grade-point average of 2.00 or better. A major may require a senior paper or project and/or a comprehensive examination.

Bachelor of Fine Arts, Bachelor of Music, Bachelor of Science

Requirements for the B.F.A. degree are on page 25; for the B.M. degree, on page 32; and for the B.S. degree, on pages 39, 53, 67, and 77.

Associate in Arts

1. Completion of at least 64 credits with a minimum grade-point average of 2.00 based on a 4.00 scale.

2. Completion of general education requirements as follows (no pass/fail allowed):

   a. one course in writing skills

   b. one course in quantitative reasoning

   c. one course in the biological sciences, or physical sciences, or technology

   d. three courses chosen from the following, with no more than one from each category: historical perspectives; foreign culture; fine arts; social science; works of philosophy, literature, and ideas

   The Division of Continuing Education may prescribe up to four of the six required courses used to satisfy the general education requirements. A list of courses that may be used to meet these requirements will be available from an adviser.

3. A minimum of four courses freely selected by the student.

4. The remaining courses or credits may be earned in one of the career concentrations described on page 93 and/or in elective general education courses.

5. The last 16 credits must be University of New Hampshire courses completed at UNH following admission and matriculation, unless permission is granted to transfer part of this work from another institution.

Dual Degrees

The opportunity to pursue simultaneously two undergraduate degrees enhances and broadens the education of certain students. The program is only for those students who can adequately handle the requirements for two different degrees and who can reasonably allocate the additional time and effort needed for the program. Except for specific five-year degree programs (page 19), a student may not pursue two different degree levels simultaneously.

Requirements

1. Students desiring dual degrees must petition the college dean or deans involved for permission.

2. Students planning to take one degree in a highly prescribed curriculum should register as freshmen in the appropriate school or college for that curriculum.

3. It is expected that candidates for two degrees will complete 32 credits beyond those required for the first degree.

4. Students can earn more than one bachelor of science (B.S.) degree, provided that each degree is in a different field. Students cannot earn more than one bachelor of arts (B.A.) degree.

5. Transfer students already holding a baccalaureate degree from another accredited institution may pursue an additional baccalaureate degree at the University of New Hampshire provided they fulfill the previously listed requirements. The degree received at the first institution will be accepted by UNH as awarded by that institution.

Supervision

As soon as a student is accepted as a candidate for two degrees, the appropriate dean(s) will appoint supervisors for each of the proposed majors. The supervisors and the student will work out a basic course plan for the two degrees and inform the appropriate dual degree dean(s) of the plan. The supervisors will maintain joint control over the student's academic program. The college offices and the supervisors will receive copies of grade reports and other records for students pursuing two degrees.

Minimum Graduation Average

A cumulative grade-point average of 2.00 in University of New Hampshire courses is the minimum acceptable level for undergraduate work in the University and for graduation. In addition, some majors require a grade-point average greater than 2.00 in certain courses or combinations of courses. The Academic Standards and Advising Committee examines the records of students periodically and may place academically deficient or potentially deficient students on warning, or may exclude, suspend, or dismiss those who are academically deficient.

Quota of Semester Credits

Students registering for more than 20 credits must receive the approval of the college dean.

Undergraduates are assigned class standing on the basis of semester credits of academic work completed with a passing grade, as follows: to be a sophomore—26 credits; to be a junior—58 credits; to be a senior—90 credits.

Residence

"Residence" means being enrolled in University of New Hampshire (including UNH at Manchester) courses after admission to and matriculation in a degree program. Students who are candidates for a bachelor's degree must attain the last one-quarter of total credits for the degree in residence unless granted permission by the Academic Standards and Advising Committee to transfer part of this work from other accredited institutions.

Leave of Absence or Withdrawal from the University

Students who leave the University are required to file formal notification with the registrar. (See also page 6, Transfer from Baccalaureate Program to Associate Program.)

Majors, Minors, and Options

Majors and some interdisciplinary minors are described under their various schools and colleges; other interdisciplinary and intercollege minors are described in the section on Special University Programs.

Student-Designed Majors

See page 85 for requirements for a student-designed major.

Second Majors

Bachelor's degree students may choose to fulfill the requirements of two dissimilar major programs, provided they obtain the approval of their principal adviser and the dean(s) of the college(s) in which the programs are offered, and comply as follows:

1. If the two majors are offered in different schools or colleges within the University, the admissions requirements of each must be satisfied.

2. If the two majors have two distinct degrees, e.g., B.A., B.S., or some other designated degree, students must choose which of the two degrees is to be awarded and fulfill all requirements for that degree.

3. No more than 8 credits used to satisfy requirements for one major may be used as requirements for the other major.

Minors

Students may earn a minor in any undergraduate discipline designated by the University. A list of minors is available from the advising coordinator in each college or school (or see the lists for each school in this catalog). Students must consult with the major adviser and the minor supervisor. A minor typically consists of 20 credits with C– or better and a 2.00 grade-point average in courses that the minor department approves. Courses taken on the pass/fail basis may not be used for a minor. No more than 8 credits used to satisfy major requirements may be used for the minor. Students should declare an intent to earn a minor as early as possible and no later than the end of the junior year. During the final term, an application should be made to the dean to have the minor shown on the academic record.

Options

Some degree programs offer a selection of options (e.g., art history and art studio through the Department of the Arts). These areas of concentration allow students to specialize within a discipline. The choice of option is recorded on the student's transcript.

Degrees and Major Programs of Study

College of Liberal Arts

The teacher education division of the College of Liberal Arts coordinates the five-year undergraduate/graduate teacher education program. See page 27.

Bachelor of Arts
Anthropology
The Arts
- Art History
- Art Studio

Classics
Communication
English
English/Journalism
English Teaching
French
Geography
German
Greek
History
Humanities
Latin
Linguistics
Music
- Music History
- Music Theory
- Performance Study
- Preteaching

Philosophy
Political Science
Psychology
Russian
Sociology
Spanish
Theatre

Bachelor of Fine Arts
Fine Arts

Bachelor of Music
Music Education
Organ
Piano
Strings, Woodwinds, Brass, or Percussion
Theory
Voice

College of Life Sciences and Agriculture

Bachelor of Arts
Entomology
Plant Biology
Zoology

Bachelor of Science
Adult and Occupational Education
Animal Sciences
- Bioscience and Technology
- Equine Sciences
- Preveterinary Medicine

Biochemistry
Biology
- Ecology and Evolutionary Biology
- General Biology
- Marine and Freshwater Biology
- Molecular, Cellular, and Developmental Biology

Community Development
Dairy Management
Entomology
Environmental Conservation
- Environmental Affairs
- Environmental Science

General Studies
Horticulture and Agronomy
Microbiology
Nutritional Sciences
Plant Biology
Resource Economics
Soil Science
Tourism
Water Resources Management
Wildlife Management
Zoology

Bachelor of Science in Forestry
Forestry
- Forest Management
- Forest Science

College of Engineering and Physical Sciences

Bachelor of Arts
Chemistry
- Environmental Chemistry

Chemistry and Physics Teaching
Earth Science Teaching
Earth Sciences
Mathematics
Physics

Bachelor of Science
Chemical Engineering*
- Energy
- Environmental Engineering

Chemistry*
- Environmental Chemistry

Civil Engineering*
Computer Science*
Electrical Engineering*
- Computer Engineering
- Electrical Engineering Systems
- Student-Designed Option

Electrical Engineering Technology*
Geology*
Hydrology*
Mathematics*
Mathematics Education*
- Elementary
- Middle/Junior High
- Secondary

Mathematics (Interdisciplinary)
- Mathematics—Chemistry
- Mathematics—Computer Science
- Mathematics—Economics
- Mathematics—Electrical Science
- Mathematics—Fluid Dynamics
- Mathematics—Mechanics
- Mathematics—Physics
- Mathematics—Statistics
- Mathematics—Thermodynamics

Mechanical Engineering*
- Energy

Mechanical Engineering Technology*
Physics*

School of Health and Human Services

Bachelor of Arts
Social Work

Bachelor of Science
Communication Disorders
Family and Consumer Studies
- Child and Family Studies
- Consumer Studies

Health Management and Policy
Medical Laboratory Science
- Clinical Chemistry
- Clinical Hematology
- Clinical Immunohematology
- Clinical Microbiology

Nursing
Occupational Therapy
Physical Education
- Athletic Training
- Exercise Science
- Outdoor Education
- Pedagogy
- Sport Studies

Recreation Management and Policy
- Program Administration
- Therapeutic Recreation

Whittemore School of Business and Economics

Bachelor of Arts
Economics

Bachelor of Science
Business Administration
Hotel Administration

* Designated degree (the name of the specialization is included on the diploma; e.g., B.S. in Chemistry).

Thompson School of Applied Science, of the College of Life Sciences and Agriculture

Associate in Applied Science
Applied Animal Science
Applied Business Management
Civil Technology
Food Service Management
Forest Technology
Horticultural Technology

University of New Hampshire at Manchester

Associate in Arts
General Studies
Studio Arts

Associate in Science
Biological Sciences
Business Administration

Bachelor of Arts
Communication
English
History
Humanities
Political Science
Psychology

Bachelor of Science
Business Administration
Electrical Engineering Technology*
Mechanical Engineering Technology*
Sign Language Interpretation

Division of Continuing Education

Associate in Arts
Career Concentrations
- Computer Information Studies
- Pre-Engineering and Physical Sciences

Five-Year Degree Programs
Bachelor of Arts and Master of Business Administration
Bachelor of Science and Master of Business Administration
Bachelor of Arts and Master of Education
Bachelor of Science and Master of Education

Interdisciplinary Majors

Bachelor of Arts
International Affairs
Women's Studies

Interdisciplinary Minors
American Studies
Environmental Engineering
Genetics
Gerontology
Health Promotion
History and Philosophy of Science
Humanities
Hydrology
Illumination and Optical Engineering
Justice Studies
Marine Biology
Materials Science
Ocean Engineering
Oceanography
Plant Pest Management
Religious Studies
Russian Studies
Technology, Society, and Values
War and Peace Studies
Women's Studies

Advisory Committees
Genetics
Interdepartmental Biology
Prelaw
Premedical/Predental

Graduate School
Master of Arts
Master of Science
Master of Arts in Teaching
Master of Business Administration
Master of Education
Master of Health Administration
Master of Occupational Education
Master of Public Administration
Master of Science for Teachers
Certificate of Advanced Graduate Study
Doctor of Philosophy

Program Abbreviations

The following abbreviations are used to identify undergraduate and graduate courses offered at the University. An asterisk (*) preceding the letters identifies those disciplines offering graduate-level coursework.

College of Liberal Arts

ANTH	Anthropology
ARTS	The Arts
CHIN	Chinese
CLAS	Classics
CMN	Communication
DANC	Dance
* EDUC	Education
* ENGL	English
FREN	French
GEOG	Geography
GERM	German
GREK	Greek
* HIST	History
HUMA	Humanities
ITAL	Italian
JPN	Japanese
LATN	Latin
LING	Linguistics
* MUSI	Music
* MUED	Music Education
PHIL	Philosophy
* POLT	Political Science
PORT	Portuguese
* PSYC	Psychology
RS	Religious Studies
RUSS	Russian
SCSC	Social Science
* SOC	Sociology
* SPAN	Spanish
THEA	Theatre
WS	Women's Studies

College of Life Sciences and Agriculture

AOE	Adult and Occupational Education
* ANSC	Animal and Nutritional Sciences
* BCHM	Biochemistry and Molecular Biology
BIOL	Biology
CD	Community Development
EC	Environmental Conservation
* ENTO	Entomology
FOR	Forestry
* GEN	Genetics
* MICR	Microbiology
NR	Natural Resources
NUTR	Nutritional Sciences
* PBIO	Plant Biology
* RAM	Resource Administration Management
* RECO	Resource Economics
* SOIL	Soil Science
TOUR	Tourism
WARM	Water Resources Management
* WILD	Wildlife Management
* ZOOL	Zoology

College of Engineering and Physical Sciences

* CHE	Chemical Engineering
* CHEM	Chemistry
* CIE	Civil Engineering
* CS	Computer Science
* ESCI	Earth Sciences
* EE	Electrical and Computer Engineering
ET	Engineering Technology
* MATH	Mathematics
* ME	Mechanical Engineering
* OE	Ocean Engineering
* PHYS	Physics
TECH	Technology (nondepartmental)

School of Health and Human Services

* COMM	Communication Disorders
* FS	Family Studies
HMP	Health Management and Policy
HHS	Health and Human Services
MLS	Medical Laboratory Science
* NURS	Nursing
OT	Occupational Therapy
* PHED	Physical Education
RMP	Resource Management and Policy
SW	Social Work

Whittemore School of Business and Economics

ACFI	Accounting and Finance
* ADMN	Business Administration
DS	Decision Sciences
* ECON	Economics
HOTL	Hotel Administration
MGT	Management
MKTG	Marketing

Separate Departments and Programs

ADM	Business Administration—UNHM
ASL	American Sign Language
AMST	American Studies
AERO	Aerospace Studies
CIS	Computer Information Systems
DCE	Division of Continuing Education (all courses)
ECN	Economics—UNHM
* EOS	Earth, Oceans, and Space
GERO	Gerontology
IA	International Affairs
INCO	Intercollege
INTR	Sign Language Interpretation
JUST	Justice Studies
MILT	Military Science
TSAS	Thompson School of Applied Science
UNHM	University of New Hampshire at Manchester

College of Liberal Arts

Stuart Palmer, Dean
John T. Kirkpatrick, Associate Dean
Arnold S. Linsky, Senior Faculty Fellow
Robert C. Gilmore, Senior Faculty Fellow
Janet Aikins, Faculty Fellow

Fine Arts Division
Department of the Arts
Department of Music
Department of Theatre and Dance

Humanities Division
Department of English
Department of French and Italian
Department of German and Russian
Department of Philosophy
Department of Spanish and Classics

Social Science Division
Department of Communication
Department of Geography
Department of History
Department of Political Science
Department of Psychology
Department of Sociology and Anthropology

Teacher Education Division
Department of Education

Bachelor of Arts
Anthropology
The Arts
- Art History
- Art Studio

Classics
Communication
English
English/Journalism
English Teaching
French
Geography
German
Greek
History
Humanities
Latin
Linguistics
Music
- Music History
- Music Theory
- Performance Study
- Preteaching

Philosophy
Political Science
Psychology
Russian
Sociology
Spanish
Theatre
Women's Studies

Bachelor of Fine Arts
Fine Arts

Bachelor of Music
Music
- Music Education
- Organ
- Piano
- Strings, Woodwind, Brass, or Percussion
- Theory
- Voice

It is the purpose of the College of Liberal Arts, as a center of learning and scholarship, to help students achieve an understanding of the heritage of civilization and to educate them in the tradition of the past and realities of the present so that they may recognize and act upon their obligations to the future.

The college seeks to meet the educational needs of each student through the development of interests and skills, which, combined with the individual's potential, makes possible the living of a richer, more useful life.

Degrees

The College of Liberal Arts offers three degrees: bachelor of arts, bachelor of fine arts, and bachelor of music.

Bachelor of Arts

These programs primarily provide a broad liberal education along with a major in one of the fields listed on this page. Requirements for the bachelor of arts degree and information regarding these majors are presented on pages 16 and 24.

Bachelor of Fine Arts

This curriculum provides training for students who plan to enter a professional graduate school. Requirements for the bachelor of fine arts degree are outlined on page 25.

Bachelor of Music

This curriculum provides professional training in performance, in musical theory, and in music education, and it allows students to develop their talent to a standard equivalent to the one achieved at conservatories of music. Requirements for the bachelor of music degree and information regarding the curriculum are presented on page 32.

Five-Year Program: B.A.-M.B.A.

The College of Liberal Arts and the Whittemore School of Business and Economics offer a combined five-year program leading to a B.A. degree in French, philosophy, or psychology and an M.B.A. degree. Information about the program can be obtained from those departments or from the undergraduate counselor in the Whittemore School.

Combined Programs of Study

In addition to pursuing a single major, students may combine programs of study as follows:

Minors: See page 17; see also interdisciplinary minors, page 19 and below.
Second Majors: See page 17.
Dual-Degree Programs: See page 16.
Student-Designed Majors: See page 85.
Other combined programs and interdisciplinary opportunities: See page 82.

Interdisciplinary Minors

American Studies

The American studies minor offers a wide variety of opportunities for the interdisciplinary study of American culture. Students learn basic methods of interdisciplinary study by examining the history, literature, arts, politics, and other aspects of American life. The minor encourages students to take advantage of the rich resources of the New England region, through work at libraries and museums as well as in independent study and fieldwork projects. Many of the courses in the minor are team taught in order to encourage a close relationship between faculty and students. Independent study and fieldwork projects will be

approved by the faculty member supervising the work and by the coordinator of the American studies minor. Field experience may involve internships at local museums, libraries, historical societies, and other institutions dedicated to the study and preservation of American culture.

Further information is available from the American studies coordinator and the University Advising Center. Any faculty member teaching in the program may serve as a contact person.

The American studies minor consists of five courses. Students must take at least one course concentrating on the issues of gender, race, or ethnicity in America (starred [*] courses). Students are encouraged to take American studies 696 or other seminars in American studies when offered by participating departments.

Two Required Courses

AMST 501, Introduction to American Studies
One of the following: HUMA 607, 608*, 609*, or 610

Three Elective Courses

AMST 502
AMST 696
ANTH 500A*, 501A*
ARTS 487E, 654, 693
CMN 505
DANC 463
ECON 515
ENGL 515, 516, 522, 525, 616†, 650, 685†, 690*, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750
GEOG 513, 610
HIST 505*, 506*, 507*, 511, 566*, 603*, 605, 606, 611, 612, 615, 616, 619, 620, 621, 622, 623, 624, 625
MUSI 511
POLT 500, 504, 508, 512, 513, 600, 610, 623
SOC 520, 530*, 540, 645
THEA 450
WS 595†, 796†, 798†

† These courses may be taken as electives when the subject is in American studies

Students may wish to concentrate their major work in courses related to American studies. The three elective courses may not be in the student's major department. No more than two courses of the five for the minor may be at the 500 level. Departmental prerequisites may be waived for American studies students at the discretion of the instructor.

For more information contact David Watters, Department of English.

History and Philosophy of Science

Why have people in different periods had such strangely diverging views on such questions as the motion of the heavens, or the nature of the human body, or the logic that governs human actions and desires? And what do these differences say about the truth of our own views? It is a puzzling reality of world history that the human understanding and experience of nature, society, and the mind have varied greatly with place and time. This minor provides students with an opportunity to explore this intriguing variety—both in terms of its historical origins and its philosophical implications. The minor is highly interdisciplinary, offering courses in such diverse departments as economics, history, mathematics, philosophy, and psychology. It presupposes no specialized scientific background and may be combined with any undergraduate major. Five 4-credit courses are required for the minor, with no more than three from any single department.

Students interested in minoring in history and philosophy of science should contact the coordinator, Jan Golinski, Horton Social Science Center.

ECON 615, History of Economic Thought
ECON 698, Topics in Economics*
ECON 798, Economic Problems*
HIST 521, The Origins of Modern Science
HIST 522, Science in the Modern Period
HIST 523, Introduction to the History of Science
HIST 621, 622, History of American Thought
HIST 651, 652, European Intellectual History
HIST 654, Topics in History of Science
HUMA 651, Humanities and Science: The Nature of Scientific Creativity
MATH 419, Evolution of Mathematics
PHIL 424, Science, Technology, and Society
PHIL 435, The Human Animal
PHIL 630, Philosophy of the Natural Sciences
PHIL 683, Technology: Philosophical and Ethical Issues
PHIL 725, Philosophy of the Social Sciences
PHIL 780, Special Topics in Philosophy*
PSYC 571, The Great Psychologists
PSYC 591, Special Topics in Psychology*
PSYC 770, History of Psychology
PSYC 771, Psychology in 20th-Century Thought and Society

*with approval

Humanities

The humanities minor studies the fundamental questions and issues of Western civilization. (For a more complete description, see Humanities, page 33.) The minor consists of a minimum of 20 credits of academic work (five courses), with a minimum grade of C from the following courses:

Two courses from either the 501/502/503 sequence or the 510/511/512/513 sequence

HUMA 501, Humanities: The Ancient World
HUMA 502, Humanities: The Modern World
HUMA 503, Humanities: The 20th Century
HUMA 510, Chance, Necessity, and Reason: The Search for the Good Life
HUMA 511, Fortune, Sin, and Faith: The Search for the Spiritual Life
HUMA 512, Reason, Doubt, and Experience: The Search for the Enlightened Life
HUMA 513, History, Mind, and the Absurd: The Search for the Meaningful Life

Two 600-level humanities courses

HUMA 607, The American Character: Religion in American Life and Thought
HUMA 608, Arts and American Society: Women Writers and Artists, 1850–Present
HUMA 609, Ethnicity in America: The Black Experience in the Twentieth Century
HUMA 610, Regional Studies in America: New England Culture in Changing Times
HUMA 650, Humanities and the Law: The Problem of Justice in Western Civilization
HUMA 651, Humanities and Science: The Nature of Scientific Creativity
HUMA 695, Special Studies in the Humanities

Humanities Program Seminar

Either HUMA 500, Critical Methods in the Humanities, *or*
HUMA 600, Seminar in the Humanities

For more information on the humanities minor, please consult the coordinator, David S. Andrew, Murkland.

Justice Studies

This interdisciplinary minor spans the social sciences and humanities, from criminology to philosophy of law, focusing on the relationship of law and legal systems to issues of social policy. Interested students may plan a course of study that combines various perspectives and ways of reasoning about problems of justice: jurisprudential, historical, philosophical, and scientific. Students with career interests in law, criminal justice, government, and social services are able to pursue the intellectual and practical concerns of their potential careers in conjunction with their regular coursework. The justice studies minor may be combined with any undergraduate major field.

Required Courses

POLT 507, Politics of Crime and Justice, *or*
SOC 515, Introductory Criminology
JUST 601, Field Experience in Justice Studies

Elective Courses

Students elect three additional courses from a list approved and published yearly by the Justice Studies Executive Committee. Cooperating departments include history, humanities, philosophy, political science, psychology, social work, sociology, family studies, health management and policy, recreation management and policy, resource economics, and community development.

Departmental offerings that are currently accepted for the minor include the following:

CD 717, Law of Community Planning
DCE 552, Corrections Treatment and Custody
DCE 554, Juvenile Delinquency
EC 718, Law of Natural Resources and Environment
FS 794, Families and the Law
HIST 509, Law in American Life
HIST 559, History of Great Britain
HIST 609, American Legal History: Special Topics
HMP 734, Health Law
HUMA 650, Humanities and the Law: The Problem of Justice in Western Civilization
PHIL 635, Philosophy of Law
PHIL 660, Law, Medicine, and Morals
POLT 507, Politics of Crime and Justice
POLT 508, Supreme Court and the Constitution
POLT 513, Civil Rights and Liberties
POLT 520, Justice and the Political Community
POLT 701, The Courts and Public Policy
RMP 772, Law and Public Policy in Leisure Services
SW 525, Introduction to Social Welfare Policy
SOC 515, Introductory Criminology
SOC 655, Sociology of Crime and Justice

Students who are interested in minoring in justice studies should consult with the coordinators, Susan White, 213 Horton Social Science Center, or Susan Siggelakis, 317 Horton Social Science Center.

Religious Studies

The religious studies minor offers a scholarly investigation and analysis of various religious phenomena in a multidisciplinary and cross-cultural manner. Included are such approaches as comparative religion, history of religion, philosophy of religion, psychology of religion, sociology of religion, and religious literature. It entails no sectarian or theological bias. It uses a number of scholarly methods and tools to investigate various religious traditions as well as such cross-cultural aspects of religion as prayer, belief, mythology, male and female images and roles, ritual, scripture, sectarianism, religious movements, religion and society, and religion and politics.

Students minoring in religious studies must take a survey of world religions (presently provided by RS 416, Masterpieces of Eastern Religious Literature and Ideas, and RS 417, Masterpieces of Western Religious Literature and Ideas); RS 699, Senior Seminar; and the equivalent of two other 4-credit courses—for a total of at least five courses, one of which must be at the 600 or 700 level. The two "other" courses may include RS 599, Special Topics; RS 607, The American Character: Religion in American Life and Thought; and RS 695, 696, Independent Study, or any course accepted for the minor by the Religious Studies Executive Board or approved by petition to the board. Currently, such acceptable courses include the following:

ANTH 616, Anthropology of Religion
ENGL 518, The Bible as Literature
HIST 575, The Ancient Near East
HIST 639, 640, Three Medieval Civilizations
HIST 642, The Age of Reformation
HIST 651, 652, European Intellectual History
HIST 661, 662, England in the Tudor and Stuart Periods
HIST 663, Russia: Origins to 1905
HIST 683, Religion in World History
PHIL 417, Philosophical Reflections on Religion
PHIL 520, Introduction to Eastern Philosophy
PHIL 571, Medieval Philosophy
PHIL 710, Philosophy of Religion
POLT 522, Dissent and the Political Community
SOC 797, Special Topics in Sociology: Q. Religious Movements
SPAN 526, Latin American Civilization and Culture

Students wishing to minor in religious studies or wanting more information should consult with the director, Paul Brockelman, 44 Hamilton Smith Hall.

Women's Studies

The women's studies minor offers students an interdisciplinary introduction to the status and contributions of women in various cultures and historical eras. (For a more complete description, see Women's Studies, page 40.)

For the women's studies minor, students must complete 20 credits of women's studies courses. These must include WS 401, Introduction to Women's Studies, and WS 798, Colloquium in Women's Studies, normally taken at the beginning and end of the course sequence, respectively. In between, students should select other women's studies courses or courses from departmental offerings that have been designated women's studies courses or that have the approval of the women's studies coordinator.

Other women's studies courses are WS 595, Special Topics in Women's Studies; WS 632, Feminist Thought; WS 795, Independent Study; and WS 796, Advanced Topics in Women's Studies.

Departmental offerings include the following regularly repeated courses:

ARTS 487D, Themes and Images in Art: Major Mythic Images of Women
ARTS 690, Women Artists of the Nineteenth and Twentieth Centuries
CMN 567, Images of Gender in the Media
CMN 583, Gender and Expression
ECON 698, Topics in Economics: Women in Economic Development
ENGL 585, Introduction to Women in Literature
ENGL 586, Introduction to Women Writers
ENGL 685, Women's Literary Traditions

ENGL 785 Major Women Writers
FS 645 Family Relations
HIST 565 Women in Modern Europe
HIST 566 Women in American History
NURS 545 Women's Health
SOC ANTH 625 Female, Male, and Society

Students may complete the minor requirements by selecting from other courses that are offered as special topics by the departments. In the past, such offerings have included the following: ANTH 697 Women in the Middle East; CMN 616, Women and Film; EDUC 410, Women and Education; FREN 525, French Women: Subject and Object; PHIL 510, Philosophy and Women.

Students who wish to minor in women's studies should consult with the coordinator, 304 Dimond Library, (603) 862-2194.

Special Centers

Center for the Humanities

The Center for the Humanities, located in Murkland Hall, was established in 1986 to support the arts and humanities at UNH. It currently involves about a dozen departments and more than 125 faculty members from across the University, representing such fields as literature, fine arts, anthropology, philosophy, folklore, history, religious studies, and foreign languages and literature.

Participation in the activities of the center is open to faculty members from across the University who are interested in the humanities, broadly defined. The center acts as a forum for discussion and intellectual cross-fertilization regarding humanistic issues and perspectives. It fosters and supports creative research in the humanities, both within and among disciplines. It assists humanities faculty (broadly defined) in their educational and curricular activities in general, and in the development of interdisciplinary courses and programs in particular. It serves the humanities faculty, students, programs, and community by assisting in the development and dissemination of educational and research materials. It fosters and develops outreach activities in the humanities for the state and region; and it is a focus for the humanities within the University, the state, and the region.

Institute for Policy and Social Science Research

The Institute for Policy and Social Science Research, located on the first floor of Hood House, provides financial and administrative support for social, behavioral, cognitive, and policy-related research at the University. It also works to raise the contribution that UNH faculty and students can make to public decision makers in universities, communities, New Hampshire, and the Northeast.

Work of the institute is conducted within a set of broad themes. These reflect concern for sustaining natural environments, achieving peace and social equity, providing public education, implementing microcomputer decision support systems, sustaining economic development, and increasing knowledge about human cognition and social behavior. The institute helps faculty to secure external research funds, aids in the dissemination of results, conducts short courses for senior public officials, offers research facilities to house interdepartmental groups, hosts foreign visitors to the University, and provides students with opportunities for internships in public offices.

One special resource of the institute is its UNH Poll—an advanced, computer-assisted, telephone-interviewing facility to gather and report on public attitudes about important issues. Another is the Laboratory for Interactive Learning, a facility that collects, designs, publishes, and disseminates innovative, group-centered learning materials. Of special interest is the laboratory's extensive library of educational games. A third facility is the Action Learning Complex, a 20-acre campus devoted to leadership and team-building workshops.

Major Programs of Study

The bachelor of arts programs provide a broad liberal education with a concentration involving a minimum of 32 credits in a major field. Departments may specify certain (but not more than thirteen) required courses. Students must declare a major before the beginning of the junior year. A bachelor of fine arts degree program and a bachelor of music degree program are also available (see Arts and Music). The objectives, opportunities, and departmental requirements of these programs are described below.

Anthropology

(For descriptions of courses, see page 103.)

The anthropology major, offered by the anthropology section of the Department of Sociology and Anthropology, provides an introduction to the various branches of anthropology and an appreciation of its place among other academic disciplines. At the same time, the major encourages intensive study of particular topics within the field, according to the interests and talents of students. It provides both a broad basis for the general education of students and sufficient background for those who wish to pursue a career in anthropology at the graduate level. Concentrations in archaeology and social change and development are also available.

Majors must complete a minimum of 36 credits with grades of C– (1.67) or higher and a grade-point average of 2.00 or better, distributed as follows: ANTH 411, 412, 518, 600, one topical course (516, 519, 614, 618, 625, 697, 714, or 770), one ethnographic-area course (500A, B, C, D, E, F, G, or H), and any other three courses in anthropology or related disciplines approved by the supervisor.

Students wishing to major in anthropology should consult with the anthropology chairperson.

A minor consists of five 4-credit courses in anthropology with a C– or better in each course.

The Arts

(For descriptions of courses, see page 105.)

The courses offered by the Department of the Arts provide an opportunity, within the liberal arts framework, for serious art students to acquire a thorough knowledge of the basic means of visual expression, to acquaint themselves with the history of art, or to prepare themselves for a career in art teaching. In addition, these courses offer foundation experience for students who are interested in art but are majoring in other departments in the University. The Department of the Arts offers programs leading to a bach-

elor of arts degree and a bachelor of fine arts degree. Certification for art teaching in the public schools is also offered in cooperation with the Department of Education (see Education, page 29). The fine arts general education requirement must be fulfilled by a course outside the Department of the Arts.

Bachelor of Arts Curriculum
The arts major leading to a bachelor of arts degree is offered with two options: studio art and art history.

Candidates applying for admission to the bachelor of fine arts program and all students wishing to transfer from other schools into the arts major, art studio option, are required to submit a portfolio. Students already matriculated at the University may declare the arts major, art studio option, after having completed two studio courses in the Department of the Arts with an average of C+ or above; one of these must be ARTS 532, Introductory Drawing. Students enrolling as freshmen at the University may become arts majors in the studio arts option by either of two methods: (a) by admission through acceptance of a portfolio submitted during the senior year of high school; or (b) by entering the University as an undeclared major and taking two courses in the Department of the Arts with an average of C+ or above; one of these must be ARTS 532, Introductory Drawing. There is no portfolio requirement for those entering the art history option of the arts major. The University reserves the right to retain selections from a student's work for a period of not more than two years.

Art Studio Option Students selecting the art studio option must complete a minimum of twelve courses (48 credits), of which the following are required: ARTS 532 (Introductory Drawing); one course from the following: ARTS 501 (Ceramics), ARTS 525 (Woodworking), or ARTS 567 (Introductory Sculpture); one course from the following: ARTS 536 (Introduction to Printmaking: Intaglio), ARTS 537 (Introduction to Printmaking: Lithography), or ARTS 551 (Photography); one course from the following: ARTS 544 (Water Media I) or ARTS 546 (Introductory Painting); three electives in a studio concentration; two additional studio electives; three art history courses (one 500 level and two 600 level).

While these courses represent the minimum departmental requirements for the studio option, students may wish to plan a program involving greater depth in one or several of the studio areas.

Art History Option Students selecting the art history option must complete a minimum of eleven courses (44 credits), of which the following are required: ARTS 532 (Introductory Drawing); two courses at the 500 level or one course at the 500 level and one course at the 400 level passed with a grade of B– or above; ARTS 795 (Methods of Art History); ARTS 799 (Seminar in Art History); five additional courses in art history at the 600 level or above, of which at least one must be in the Pre-Renaissance areas, at least one from the Renaissance Baroque area, at least one from the modern area, and at least one from architectural history; and one additional studio course. Art history majors will receive preferential placement only in the following studio course: ARTS 532. Students majoring in art history are strongly advised to take ENGL 501, Introduction to Prose Writing, and two foreign languages, one of which should be German.

Bachelor of Fine Arts Curriculum
The bachelor of fine arts curriculum provides training for students who plan to enter professional graduate school or pursue careers as professional artists. The basic unit of nine courses consists of drawing (ARTS 532 and one section of ARTS 632); beginning painting (ARTS 546); introductory sculpture (ARTS 567); sophomore seminar (ARTS 598); introductory photography (ARTS 551); and four art history courses, at least one of which must be at the 600 level or above. This unit is designed to provide a common body of concepts and techniques and is intended to raise the level of creative achievement for all students in the B.F.A. degree curriculum.

During the junior and senior years, students will concentrate on six courses, two of which must be at the 600 level, in one of the major program areas of the department. The programs are (1) painting, (2) sculpture, and (3) individualized programs. Individualized programs may be designed in the following subject areas: (A) ceramics; (B) drawing; (C) printmaking; (D) photography; and (E) furniture design. Proposals for individualized programs are accepted only by permission of the department chairperson, the major adviser, and the departmental Bachelor of Fine Arts Faculty Committee. Advanced students will also be required to take three art electives. Finally, each senior will be required to take ARTS 798, Seminar: Senior Thesis, which culminates in the mounting of an exhibition of the student's work. (Printed copies of suggested sequences of courses may be obtained from the Department of the Arts.)

Candidates applying for the bachelor of fine arts program are required to submit a portfolio to the B.F.A. committee, which meets each semester one week before preregistration.

Art Education Curriculum
The program in art education is organized into a five-year, teacher-education sequence.

This curriculum is designed to prepare teachers of art in the public schools. Completion of the B.A. or B.F.A. degree before a fifth-year internship is necessary for teacher certification. The satisfactory completion of the B.A. or B.F.A. curriculum and the fifth-year internship will satisfy the initial certification requirements for teachers of art in the public schools of New Hampshire and in most other states.

Art education majors may take accredited crafts courses at other institutions as their arts electives.

Minor in Architectural Studies
The minor in architectural studies provides students with an interdisciplinary introduction to the history, theory, and methods of architecture and its symbolism. The program allows students who are interested in this field to receive programmatic recognition for their work. It is designed to assist those who (a) are contemplating enrollment at a school of architecture; (b) are particularly interested in architectural history; (c) want to supplement their technical majors (e.g. civil engineering) with strong academic minors; or (d) plan to pursue careers in preservation, education, community service, and public relations.

The minor in architectural studies consists of 20 credits (ordinarily five courses) distributed in the following way:

Two courses in architectural history chosen from
ARTS 574, Architectural History
ARTS 654, 17th- and 18th-Century American Architecture
ARTS 655, Early Modern Architecture: Revolution to World War I
ARTS 656, Contemporary Architecture: The Buildings of Our Times
ARTS 799, Seminar in Art History

The course in architectural graphics and design
ARTS 455, Introduction to Architecture

A beginning course in drawing
ARTS 532, Introductory Drawing

An elective
Chosen in consultation with the program coordinator of the architectural studies minor (an additional course in architectural history, a studio course, or some other appropriate elective)

Admission to the minor will be authorized by the program coordinator. Interested students should consult with the coordinator in advance of selecting the minor.

Minor in Art

The minor in art consists of five courses chosen from the offerings of the department, two of which must be at the 500 level or above. Students minoring in art preregister for studio courses with departmental majors.

Classics

(For descriptions of courses, see page 113.)

While it is true that classical Greek and Latin are no longer spoken languages, the literature and art of the Ancients speak to us still. To study the classics is to come into direct contact with the sources of Western civilization and culture, both pagan and Christian. An intimate knowledge of our Greco-Roman heritage furnishes students of the classics with historical, political, and aesthetic perspectives on the contemporary world. An undergraduate classics major provides excellent preparation for careers not only in academic but also in nonacademic professions. A background in classics is, moreover, highly advantageous for applicants to graduate and professional schools in English, modern languages, history, philosophy, law, medicine, and theology. Finally, for the qualified student who is undecided about a major but interested in a sound liberal arts education, classics may be the best option.

The classics major is offered by the classics section of the Department of Spanish and Classics. The minimum requirements for a major in classics are 40 credits offered by the classics section. Twenty-four of these must be in Greek and/or Latin. A classics major must complete as a minimum a 700-level course in one of the classical languages. Students will be encouraged to take courses in related fields such as ancient history, classical art, modern languages, and English, and to take part in overseas study programs in Greece and Italy. For the requirements of the Latin and Greek majors, see pages 31 and 30.

A minor in classics consists of five courses (20 credits) in classics, Greek, and/or Latin.

The supervisor for majors is John C. Rouman.

Communication

(For descriptions of courses, see page 114.)

The Department of Communication offers a major that emphasizes a range of integrative studies in human communication, including rhetorical studies, media studies, and interpersonal/small group studies. Students are taught analysis of communication transactions through historical, critical, and empirical investigations. Students examine verbal, nonverbal, and mediated messages across a wide spectrum of communication interactions: intrapersonal, interpersonal, group, and mass. They explore connections and interrelationships among various types of communication, theoretical perspectives, and methodological approaches.

While the major emphasizes critical analysis and understanding grounded in theory and research, application of understanding to a variety of communication settings and processes is an important dimension of study.

Students wishing to declare communication as a major should contact the supervisor for majors, Professor James Farrell, for application information and requirements.

Majors must complete nine courses (36 credits). The distribution of required courses for the major is as follows:

1. CMN 455, 456, and 457. Students must earn a grade of C or better in each of these courses.
2. Three 500-level courses (12 credits), one from each of the following groups:
   a. Media Studies: CMN 505, 515, 519, 533, 567, 596
   b. Rhetorical Studies: CMN 504, 507, 557, 597
   c. Interpersonal Studies: CMN 503, 506, 530, 572, 583, 598
3. Three 600- and/or 700-level courses (12 credits). A maximum of 4 credits of independent study (CMN 795) may be counted.

Transfer students must complete 18 credits of their communication coursework at UNH to complete the major satisfactorily. Exchange students may transfer no more than 10 approved credits from another institution to be applied toward completion of the communication major at UNH.

Education

(For descriptions of courses, see page 124.)

The UNH teacher education program seeks to prepare beginning teachers who are reflective and can analyze their educational decisions. Education faculty believe that the most effective way of learning most things about teaching is by integrating theory with practice. Therefore, the teacher education program places strong emphasis on field experiences and a yearlong internship. And, since there are many effective teaching styles and legitimate philosophies of education, this program provides a broad perspective of justifiable alternatives and fosters the development of personal teaching styles.

The education programs at the University are accredited by the New Hampshire State Board of Education. New Hampshire participates in the Interstate Certification Compact; consequently, completion of the UNH teacher education program qualifies students for certification as teachers in most states.

UNH offers programs leading to teacher certification in agricultural occupations, art, biology, chemistry, earth sciences, elementary education, English, English as a second language, French, general science, general special education, German, Latin, middle and high school mathematics, nursery school/kindergarten, physical education, physics, Russian, social studies, Spanish, speech/language pathology, speech and drama, trades and industrial education, and vocational education.

Teacher education general information sessions are frequently held

throughout the year. To attend one, or to receive more detailed literature on various education programs, contact the Department of Education, 203 Morrill Hall, (603) 862-2310.

Five-Year, Undergraduate-Graduate Program

The major avenue for becoming certified to teach at the elementary, middle, or high school level is an integrated undergraduate-graduate program culminating in a fifth-year, yearlong internship. Before the internship, students earn a bachelor's degree outside the field of education. The internship offers 12 graduate credits, which students usually combine with other graduate work leading to a master's degree. A number of UNH master's degree programs may be elected, including two offered by the Department of Education that are specifically designed for preservice teaching. (See *Graduate Catalog* or *The Schoolhouse Book* for descriptions.)

Step 1. Take EDUC 500, Exploring Teaching.

Exploring Teaching (EDUC 500) provides an early experience in the schools as a teacher's aide and teaching assistant. Working side by side with experienced educators, students explore various teaching roles so that they may make realistic decisions about teaching as a career. Students are encouraged to take Exploring Teaching as a second-semester freshman or as a sophomore, but completion during junior year could also leave enough time for other education course requirements.

Step 2. Complete the second phase of the teacher education program, which includes a minimum of 4 credits in each of four areas of study: EDUC 700, Educational Structure and Change; EDUC 701, Human Development and Learning: Educational Psychology; EDUC 703, Alternative Teaching Models; and EDUC 705, Alternative Perspectives on the Nature of Education. In addition, EDUC 707, Teaching Reading through the Content Areas, is required for some secondary-level certification programs.

A number of variable-credit modules are available to students in some of these required course areas. Certain courses in other departments may be substituted for these requirements. Working closely with advisers, students may develop individualized programs, choosing from many alternatives. Since credit in these four areas of study may be taken at either the undergraduate or graduate level, students have greater flexibility for fulfilling the requirements of their college and major departments.

Additional requirements for elementary school teaching include one course in elementary school reading (EDUC 706, Introduction to Reading Instruction in the Elementary Schools) and one course in mathematics appropriate for elementary school teaching (one of the following: MATH 621, Number Systems for Teachers; MATH 622, Geometry for Teachers; MATH 623, Topics in Mathematics for Teachers).

Any course taken in the Department of Education that will be used for a teacher certification requirement must be completed with a grade of B– or better.

Step 3. Apply for admission to the fifth-year internship and master's degree program.

The final phase of the teacher education program consists of a yearlong internship (EDUC 900, 901). Students must apply for the fifth-year internship and master's degree program during the fall of their senior year so that they will have enough time to explore a variety of career and/or graduate study options and conclude their program plans before second semester of that year. Opportunities exist for some students to take courses toward their master's degree in the second semester of their senior year through early admission to the Graduate School.

Before the internship, all students will have completed a bachelor's degree with a major outside of education. Because of this, they will possess a depth of knowledge in a subject area and a broad general education, in addition to substantive preparation for teaching. Secondary education candidates must have completed an approved major, or its equivalent, in the subject that they intend to teach. Elementary education candidates may pursue an undergraduate major in any area.

The internship is an intensive, school-based experience for one academic year. Students work closely with an experienced cooperating teacher, a UNH internship supervisor, and other interns to acquire extensive skills and knowledge about classroom teaching. The master's degree can be completed during the fifth year by taking additional courses and completing a concluding experience.

Criteria for Admission to Fifth Year

To be eligible for the fifth-year internship, students must have the following: favorable evaluations from school personnel in EDUC 500, Exploring Teaching, or other clinical experiences; supportive recommendations from faculty in education coursework; a favorable recommendation from their major department; for secondary level teachers, an academic background appropriate for their desired area of teaching; and admission to a UNH graduate program.

Admission to a graduate degree program in teacher education is competitive. The following criteria are used for determining admission:

1. The undergraduate record: A minimum guideline for the undergraduate grade-point average is 2.67. The undergraduate grade-point average of the middle 50 percent of students admitted to graduate programs in teacher education falls in the range of 2.85–3.39.

2. Graduate Record Examination (GRE) general test scores: Verbal, quantitative, and analytical scores are the three scores generated by the GRE. A 400 on each section is a minimum guideline for admission. The GRE scores of the middle 50 percent of students who are admitted fall in the following ranges: verbal, 460–610; quantitative, 470–620; and analytical, 490–630.

3. Subjective evaluations of potential for teaching: Positive recommendations from EDUC 500, Exploring Teaching, and related experiences are required. Candidates must have support from those able to relay information about their prior performance in educational environments, teaching skills, academic performance and potential, motivation for teaching, and interpersonal skills.

More detailed materials on teacher education programs are available through the Department of Education, 203 Morrill Hall. Contact the department to obtain *The Schoolhouse Book* or to attend a general information session on teacher education.

Undergraduate Certification Option

Because of the specialized orientation of majors in mathematics, music edu-

cation, nursery/kindergarten, and adult and occupational education, an undergraduate option for teacher certification in these areas may be elected. This option requires the same education components listed previously, with the election of one semester of student teaching (EDUC 694) instead of the yearlong internship. Successful completion of EDUC 500 and positive recommendation from school-site staff are required for continuation in the program. Final screening takes place before the student-teaching semester. Application for acceptance into student teaching must be filed by February 15 of the junior year.

Academic standards for admission to the option include a minimum 2.50 grade-point average in the major and a minimum 2.20 cumulative grade-point average at the time of application for student teaching.

These programs have limited capacity, and admission to the University or satisfaction of minimum academic standards as stated previously does not guarantee admission to the teacher education programs.

For further information, contact the Department of Education, 203 Morrill Hall.

General Science Certification

General science certification is an interdisciplinary program that prepares students to teach science in middle and junior high schools. Many undergraduate science majors are suitable as a base for this teaching area, but students must complete coursework in each of the following areas: biology, chemistry, field natural history, physics, and earth sciences.

For more detailed information, contact Professor Judith Kull, Department of Education, 8 Morrill Hall.

English

(For descriptions of courses, see page 129.)

Through studying a wide variety of literary materials, English majors deepen their understanding of history, culture, language, and human behavior. They also gain skill in writing, reading, and critical thinking. Upon graduation, English majors traditionally enter a broad range of vocational fields and areas of graduate study.

The Department of English offers three majors: the English major, the English teaching major, and the English/journalism major. It also offers courses in writing nonfiction, fiction, and poetry; courses in linguistics; courses in film; courses in folklore; and courses for honors in English.

The English Major

The English major has two chief objectives: to provide all students with a common core of literary experience and to provide each student with the opportunity of shaping a course of study to suit individual interests. The flexibility and freedom inherent in the second of these objectives places a responsibility upon students to devise a program that has an intelligent rationale. For example, students who intend to pursue graduate study in literature written in English should choose more than the minimum number of advanced literature courses and should seek a broad, historical background. Students with special interests in linguistics or writing may, on the other hand, wish to elect only the minimum number of advanced literature courses required for the major. All students should secure the assistance and approval of their advisers in formulating an early plan for the major program.

For the English major, students must complete a minimum of 40 credits of major coursework including ENGL 519 or 529, two additional 500-level courses, and seven courses numbered 600 and above. In selecting these courses, students must be sure to meet the following distribution requirements:

1. Two courses in literature before 1800: either two advanced courses (numbered 600 or above), or one advanced course and ENGL 513.

2. Two courses in literature since 1800: either two advanced courses, or one advanced course and one course from the following list: ENGL 514, 515, or 516.

Students interested in majoring in English should consult Tory Poulin.

The English Teaching Major

This major is designed for students wishing to teach English in middle or high schools. Completion of this undergraduate major does not in itself, however, meet state certification requirements. To meet these requirements, students should enroll in the undergraduate major and, by September 15 of their senior year, apply for the fifth-year teaching internship and master's degree program. (For a full description of the program, see page 27.) Undergraduate English teaching majors must pass the following English courses with an average of 2.50 or better: ENGL 514, 516, 519 or 529, 619, 657, 710, 718 or 791, 792, and two additional literature courses numbered 600 or above. ENGL 513 may be substituted for one of these two courses.

Students who are interested in majoring in English teaching should consult the director of the English teaching program.

The English/Journalism Major

The English/journalism major is designed for students considering careers in print journalism or related fields. Students who complete the program are ready for entry-level writing or editing positions on newspapers or magazines.

The program allows students to develop their writing, reporting, and editing skills while developing a strong background in English literature. English/journalism majors must complete the literature requirements of the standard English major. In addition, they must complete ENGL 621 (Newswriting), ENGL 722 (Feature Writing), at least one other on-campus journalism course, and an internship (ENGL 720) approved by the director of the journalism program. Many journalism students work for the campus student newspaper, *The New Hampshire*. Many students hold summer jobs in journalism and some have part-time journalism jobs during the school year.

Students interested in the English/journalism major should see Tory Poulin, administrative assistant in the Department of English, or a program faculty member.

Writing Programs

The Department of English offers courses for students interested in becoming writers. Up to four consecutive creative writing workshops can be taken in fiction or in poetry, as well as a course in form and theory of either genre. The instructors for these courses are professional writers. Interested students should inquire at the departmental office.

French

(For descriptions of courses, see page 136.)

The French major provides knowledge of the language, literature, and culture of France and other French-speaking

countries. An undergraduate major in French is useful in a number of careers, such as teaching, business, law, and social service. Prospective teachers should see page 26. In addition, they should include LING 505 (which also satisfies a general education requirement for group 7) in their overall program and make special note of the FREN 791 requirement which does not count toward completion of a major in French. Students interested in nonteaching careers are urged to consult with members of the French faculty and with other appropriate departments early in their academic careers.

A major consists of 40 credits in courses numbered 631 or above, in which readings are in French. FREN 631-632, 651, 652, 790, and at least one 700-level literature course taken on the Durham campus are required of majors. Transfer students must earn a minimum of 12 major credits on the Durham campus. To complete their major, students are strongly encouraged to take either HIST 647 or 648 and courses in the literature of other countries as well as in fields such as music, art, philosophy, history, political science, and sociology that provide insight into nonliterary aspects of culture.

A minor in French consists of 20 credits in French courses numbered 503 and above. No more than one course conducted in English (e.g., FREN 525, 621, 622) will be counted toward the minor, although students may elect to take more than one such course provided they earn more than 20 credits. Members of the department supervise the work of both majors and minors.

The department offers a junior year abroad at the University of Burgundy in Dijon, France (see FREN 685-686). This program is open to all qualified students at the University of New Hampshire who have completed FREN 631-632, 651, and 652 by the end of their sophomore year. Early consultation with the director of the program is urged.

Each year, the French government offers a teaching assistantship in a French secondary school to a graduating French major nominated by the department. Applications are accepted early in the fall semester.

Five-Year, Dual-Degree Program in French and Business Administration

The dual-degree program permits students who matriculate with business backgrounds to earn both a B.A. in French and an M.B.A. in five years instead of the normal six. Students must meet all requirements for both the French major and the M.B.A. program offered by the Whittemore School of Business and Economics. A maximum of 16 credits may be counted toward both degrees. Students interested in this program should consult with the departmental adviser to the program early in their freshman year.

Geography

(For descriptions of courses, see page 138.)

Geography is best defined as the discipline that describes and analyzes the variable character, from place to place, of the Earth as the home of human society. As such, geography is an integrating discipline, studying many aspects of the physical and cultural environment that are significant to understanding the character of areas or the spatial organization of the world.

Geography aims to provide students with a basis for understanding the world in which we live.

Because its integrating character establishes common areas of interest with many other fields of knowledge, geography provides an excellent core discipline for a liberal education. Those who would understand geography must also know something of the earth sciences, as well as economics, cultures, politics, and processes of historical development.

Students who have a strong interest in the spatial organization of the world and the distinctive character of its major regions and who also want a broad educational experience can achieve these goals effectively by majoring in geography.

Students with degrees in geography have found their education valuable in such fields as urban and regional planning, locational analysis for industry and marketing organizations, cartography, geographical information systems (GIS), library work, military intelligence, international studies, the Foreign Service, travel and tourism, and journalism.

Students planning careers as scholars or teachers in the field should concentrate their coursework in geography and appropriate related disciplines and should plan to go on to graduate study after completing an undergraduate major in geography. Students from this department have been admitted to first-rate graduate schools in all parts of the United States.

Students who major in geography are required to take GEOG 401, 402, and seven additional courses in geography or related fields approved by their supervisor to a total of 36 semester credits. The seven additional courses should include GEOG 570; 572; any two courses in the group 581, 582, or 583; 590; 797; and one additional course in geography.

The department also offers an alternative concentration in urban geography. This concentration consists of six courses drawn from the geography major curriculum (401 or 402, 572, 582, 583, 590, and 797) and at least three additional courses from the following list: HIST 590, POLT 703, and CD 508, 614, and 717.

A minor consists of five courses (20 credits) in geography.

Students interested in majoring in geography should consult with the supervisor, Robert G. LeBlanc.

German

(For descriptions of courses, see page 138.)

The German major is offered by the Department of German and Russian. This program is of interest to the following groups of students:

1. Those who have a special interest in the German language, literature, and culture.

2. Those who intend to enter fields in which a background in foreign languages and literatures is desirable, such as international business, trade, journalism, science, library science, government service, and international service organizations.

3. Those who plan to teach German in secondary schools. Since most secondary schools require their teachers to teach more than one subject, students planning to enter teaching at this level should plan their programs carefully. They should combine a major in one of the languages and its literature with a minor or at least a meaningful sequence of courses in another subject. Dual majors are also possible. For certification requirements, see the department chairperson.

4. Those who intend to pursue graduate study in German language and literature, cross-cultural studies, film, or women's studies, or foreign language education in preparation for

teaching careers at the high school or university level.

A major consists of a minimum of 40 credits in German language, literature, and culture beyond GERM 503. No more than 8 of 40 credits may be taken in English toward the major (GERM 521 or 523; 525). Required for the major are GERM 504, 525, 601, 631, 632 (or their equivalents) and 20 other credits, 12 of which must be taken in Durham on the 600 and 700 levels (excluding 795, 796). GERM 520 and 791 do not count for major credit (720 is the equivalent of 520 for majors); 791 is recommended as an elective and required for teacher certification. Majors are required to spend the minimum of one semester in an approved German-speaking study abroad program, or equivalent.

A minor consists of 20 credits in German courses numbered 503 and above. The minor may include one course taught in English (520, 521, 523, or 525) but not 791.

Study Abroad

(See also INCO 685, 686.) The University allows both German majors and minors and other students to attend approved study abroad programs for UNH credit. Programs frequently chosen include a work study term in Hamburg or semester or year programs at universities such as Bonn, Freiburg, Heidelburg, Marburg, Munich, Tübingen, or Berlin. Most programs require a minimum of two years of college German. For intensive language study at any level, students may attend Goethe-Institut centers in Germany for one or more eight-week courses. For details, see the foreign study coordinator, Center for International Perspectives, or the Department of German and Russian. Financial aid applies to all approved programs.

Greek

(For descriptions of courses, see page 140.)

The Greek major is offered by the classics section of the Department of Spanish and Classics. The supervisor for majors is John C. Rouman.

The minimum requirements for a major in Greek are: 32 credits in Greek, including GREK 401-402. Students are encouraged to take courses in related fields such as Latin, classics, and ancient history, and to take part in overseas study programs in Greece.

History

(For descriptions of courses, see page 141.)

The study of history is an essential element of the liberal education. The history major provides both an awareness of the past and the tools to evaluate and express one's knowledge. The student who majors in history will have the opportunity to study the breadth of the human past and will acquire the skills in critical reading and writing which form the foundation of the educated life. The study of history may include all of human culture and society and provides tremendous latitude in the subjects which may be studied. The interdisciplinary nature of the field makes it a natural focus for study which may encompass a variety of other fields.

Students majoring in history must complete ten 4-credit history courses or their equivalent with a grade of C– or better, and an overall average in these courses of 2.00 or better. History majors are urged to complete HIST 500, Introduction to Historical Thinking, in the semester following declaration of major and must complete it no later than the second semester following declaration of major. Majors must take HIST 797, Colloquium in History, during their senior year. In addition to 500 and 797, a major must take at least eight courses, of which a minimum of three must be at the 600 level or above. Only one 695/696 independent study course may be used to fulfill the 600-level requirement, and no more than two independent study courses may count toward the ten-course requirement. No more than two 400-level courses may be counted toward the major requirements. General education courses offered by the department may be counted for major credit or for general education credit, but not for both.

The student's program of study must include two parts:

(1) An area of specialization. A student must select at least five courses to serve as an area of specialization within the major. Up to two courses (each 4 credits or their equivalent) in the area of specialization may be taken in other departments. Such courses must be 500 level or above and have the approval of the student's adviser. The area of specialization may be in a nation, region, a time period, or an interdisciplinary field.

(2) Complementary courses. A student must select, in consultation with his or her adviser, at least two history courses in fields outside the area of specialization, chosen to broaden his or her understanding of the range of history.

The program must be planned in consultation with an adviser. A copy of the program, signed by one's adviser, must be placed in one's file no later than the second semester of one's junior year. Courses at the 700 level will be judged by one's adviser as to their applicability for area of specialization or complementation. The program may be modified with the adviser's approval.

Students who enter the University as history majors and continuing students intending to declare a history major are considered "provisional majors" and are advised in the University Advising Center until they complete two history courses with a C– or better and have registered for HIST 500. At that time they can confirm their major and be assigned a departmental adviser. Provisional majors are accorded all the rights and privileges of any history major.

For transfer students, a minimum of five of the semester courses used to fulfill the major requirements must be taken at the University. One upper-level course may be transferred to satisfy the requirement that a major must take at least three courses numbered 600 or above. Transfer students must complete both HIST 500 or its equivalent and HIST 797.

A minor in history consists of 20 semester credits with C– or better and at least a 2.00 grade-point average in courses that the Department of History approves. Courses taken on a pass/fail basis may not be used for the minor. No more than 12 credits in 400-level courses may be used for this minor. For transfer students, a minimum of two of the semester courses, or 8 credits, must be taken at the University of New Hampshire with a grade of C– or better.

Students intending further work in history beyond the bachelor's degree are urged to take HIST 775, Historical Methods.

Students intending to major in history should consult with the department secretary in Horton 405. Suggested programs for students with special interests or professional plans are available in the department office.

Undergraduate Awards for Majors
Each spring the members of the departmental undergraduate committee choose one or more senior majors to receive the William Greenleaf Prize in History. Award candidates must have a minimum grade-point average of 3.20 in history courses and must submit a major paper completed for a history course or written specifically for this award. Individuals may nominate themselves or may be nominated by faculty members. Phi Alpha Theta, the history honor society, is open to majors who have a minimum grade-point average of 3.20 in history courses.

Humanities

(For descriptions of courses, see page 145.)

The humanities program examines the fundamental questions and issues of Western civilization. Through studying diverse texts in the arts, music, literature, history, philosophy, and science, students seek answers to questions that thoughtful human beings often address in the course of their lives. Whether these questions come from Socrates (What is justice?), from Sir Thomas More (What is obligation to God?), from Raphael (What is beauty?), from Newton (What are the laws of nature?), or from Martin Luther King, Jr. (What is freedom?), they direct our attention to enduring human concerns and to texts that have suggested or illustrated the most profound and powerful answers.

Humanities Major
The humanities major consists of a minimum of 40 credits of academic work, with a minimum grade of C, including the following core requirements:

1. *Critical Methods in the Humanities* (HUMA 500)

2. *Integrated Core Courses* (HUMA 501, 502, 503, or 510, 511, 512, 513). Each student takes at least two courses (8 credits) from the 501/502/503 sequence or at least two courses (8 credits) from the 510/511/512/513 sequence, preferably in the freshman and/or sophomore year.

3. *Seminar in the Humanities* (HUMA 600). Each student takes at least one offering (4 credits) of the Seminar in the Humanities, preferably before the end of the junior year. This seminar provides an opportunity for in-depth reading, viewing, and/or listening to texts and artifacts. The emphasis is on the multiple perspectives and methodologies that can be brought to bear upon these works from several humanistic disciplines.

4. *Research Seminar in the Humanities* (HUMA 700). Each student participates in the research seminar (4 credits) in the final semester of the senior year. The seminar provides a context within which students may discuss and receive directions in the course of completing a major research paper. At the end of the seminar, students present their research to the faculty and their fellow students.

5. *Additional Requirements.* Beyond the 16 credits of core requirements, each student must fulfill the following requirements: (1) a minimum of 8 additional credits in 600-level humanities program courses; (2) an additional 12 credits from humanities program offerings or from the offerings of other departments and programs, with the advice and approval of each student's major adviser or the program coordinator. These offerings should bear some relation to the student's particular interests and senior research paper, as seem appropriate in each individual case.

Humanities Minor
The humanities minor consists of the following courses: (1) two courses from either the 501/502/503 sequence or the 510/511/512/513 sequence; (2) two 600-level humanities courses; and (3) either Critical Methods in the Humanities or Seminar in the Humanities.

Inquiries about the humanities major and minor should be directed to David S. Andrew, coordinator of the humanities program, 2 Murkland Hall.

Latin

(For descriptions of courses, see page 148.)

The Latin major is offered by the classics section of the Department of Spanish and Classics. The supervisor for majors is John C. Rouman.

The minimum requirements for a major in Latin are 32 credits in Latin, excluding LATN 401-402. Students are encouraged to take courses in related fields such as Greek, classics, and ancient history, and to take part in overseas study programs in Italy.

Linguistics

(For descriptions of courses, see page 148.)

Linguistics is the study of one of the most important characteristics of human beings—language. It cuts across the boundaries between the sciences and the humanities. The program is an excellent liberal arts major or preprofessional major for law, medicine, clergy, and others. It is a particularly appropriate major for students who want to teach English as a foreign language. Dual majors with a foreign language, business administration, and the like, are quite feasible.

Students interested in the major or the minor should consult with the program coordinator or with any professor who teaches linguistics courses. To declare a major in linguistics, a student must first submit a proposal, signed by a faculty sponsor, to the Linguistics Committee. Information is available from the Advising Center, Hood House.

A minor in linguistics is also available and consists of any five linguistics courses approved by the linguistics coordinator.

Requirements for the Major

1. LING 505, Introduction to Linguistics
2. LING 506, Introduction to Comparative and Historical Linguistics; or ENGL 752, History of the English Language
3. LING 605, Introduction to Linguistic Analysis
4. LING 793, Phonetics and Phonology
5. LING 794, Syntax and Semantic Theory
6. Two years college study (or equivalent) of one foreign language
7. One of the following:

(a) One year of study (or equivalent) of a second foreign language from a different language family or subfamily (Old English may count as the second foreign language if the first foreign language is not in the Germanic family);

(b) PSYC 712, Psychology of Language (with its prerequisite PSYC 512, Psychology of Primates, or PSYC 513, Cognitive Psychology);

(c) PHIL 745, Philosophy of Language (with its prerequisite PHIL 412, Beginning Logic, or PHIL 550, Logic);

(d) The following sequence of courses from the Department of Computer Science: CS 415-416, Introduction to Com-

puter Science I and II; CS 730, Introduction to Artificial Language; CS 765, Introduction to Computer Linguistics.

8. Three elective courses from the list below (students who select option 7 (d) are required to take only *two* courses from the list below):

Area Courses

Anthropology: 795, 796, Reading and Research in Anthropology: B. Anthropological Linguistics.

Communication: 572, Language and Behavior; 672, Theories of Language and Discourse.

Communication Disorders: 522, The Acquisition of Language.

Computer Sciences: 765, Introduction to Computer Linguistics.

English: 715, TESL: Theory and Methods; 716, Curriculum Design, Materials, and Testing in English as a Second Language; 718, English Linguistics and Literature; 752, History of the English Language; 778, Brain and Language; 779, Linguistic Field Methods; 790, Special Topics in Linguistic Theory; 791, English Grammar; 793, Phonetics and Phonology; 794, Syntax and Semantic Theory.

French, German, Greek, Latin, Russian, Spanish: 791, Methods of Foreign Language Teaching.

Latin: 795, 796, Special Studies in Latin.

Linguistics: 505, Introduction to Linguistics; 506, Introduction to Comparative and Historical Linguistics; 779, Linguistic Field Methods; 790, Special Topics in Linguistic Theory; 793, Phonetics and Phonology; 794, Syntax and Semantic Theory; 795, 796, Independent Study.

Philosophy: 550, Logic; 618, Recent Anglo-American Philosophy; 745, Philosophy of Language.

Psychology: 512, Psychology of Primates; 513, Cognitive Psychology; 712, Psychology of Language. (Students may count either PSYC 512 or 513 toward the linguistics major or minor, but not both.)

Russian: 734, History and Development of the Russian Language.

Sociology: 797F, Socio-Linguistics.

Spanish: 601, Spanish Phonetics; 733, History of the Spanish Language; 790, Grammatical Structure of Spanish.

Other courses may be substituted, with the permission of the student's adviser and the Linguistics Committee, when they are pertinent to the needs of the student's programs.

Music

(For descriptions of courses, see page 157.)

The Department of Music offers two degree programs: the bachelor of arts and the bachelor of music.

The Department of Music is a member of the National Association of Schools of Music. Prospective majors in music are advised to consult with Paul Verrette.

Bachelor of Arts Program

The bachelor of arts program offers students an opportunity to major in music within the liberal arts curriculum. This program is intended for those who wish to pursue the serious study of music and to acquire at the same time a broad general education; it is recommended for those considering the five-year undergraduate-graduate program in teacher education or graduate study leading to the M.A. or Ph.D. degrees.

To be admitted formally to the B.A. program, students must give evidence of satisfactory musical training by taking an admission audition. Students must declare music as a major before the beginning of the junior year, but it is highly recommended that they declare as early as possible, considering the large number of required courses. Admission to the upper level of the degree program will be subject to review by the Department of Music faculty.

The bachelor of arts degree is offered with four options: music history, performance study, music theory, and preteaching. The following courses are required of all students: Theory I and Ear Training I (MUSI 471-472, 473-474), Theory II and Ear Training II (MUSI 571-572, 573-574), History and Literature of Music (MUSI 501-502), and one course from MUSI 771 (Counterpoint) or MUSI 781, 782 (Analysis: Form and Structure). Other requirements, grouped by option, are shown below.

Music History Option Advanced theory (3 credits); advanced history and literature (12 credits); any one of 541–550 inclusive (8 credits). Students must also demonstrate the ability to sight-read a Bach chorale harmonization.

Music Theory Option Advanced theory (12 credits); advanced history (3 credits); any one of 541–550 inclusive (8 credits). Students must also demonstrate the ability to sight-read a Bach chorale harmonization. The emphasis in this option is on musical composition and/or theory.

Performance Study Option Advanced theory or literature (3 credits); performance study (16 credits—2 credits per semester). Qualified students may concentrate in voice, piano, strings, woodwinds, brass, or percussion. Those choosing voice must successfully complete, in addition to the foreign language requirement, one of the following course sequences: ITAL 401-402, GERM 401-402, FREN 401-402.

Music Preteaching Option EDUC 500; MUSI 751-752; MUSI 779; techniques and methods (8 credits); 8 credits from MUSI 441–453 inclusive; 8 credits from any one of MUSI 541–550; departmental piano proficiency exam. The music preteaching option is a part of the five-year graduate-undergraduate certification program (see page 30). The department also offers a four-year program leading to teacher certification, the bachelor of music with a major in music education.

A public performance is given during the senior year. For students in the music history option, this must be a lecture or lecture-recital; for those in performance study, a full recital; for students in the music theory option, a lecture, lecture-recital, or a recital including at least one original composition; for those in the preteaching option, a half recital is the minimum.

Bachelor of Music Program

The bachelor of music degree program is offered to students who wish to develop their talent in performance, composition, or music education to a high professional level. The program is recommended to those considering graduate study leading to the M.M. or D.M.A. degrees. The music education option is part of the undergraduate certification program (see page 27).

To be admitted to the B.M. program, students must demonstrate a high degree of musical competence or significant creative ability during an audition or examination. Selectivity is exercised as appropriate to the professional requirements of each programmatic option. Students must formally declare the B.M. as a degree program before the beginning of the sophomore year. Continuation into the upper level of the program is subject to review by the department faculty.

The bachelor of music curriculum offers concentration in the following areas, as detailed below: option 1, piano; option 2, organ; option 3, voice; option 4, strings, woodwinds, brass, or percussion; option 5, theory (composition); option 6, music education.

Students in music education must

maintain a minimum 2.50 grade-point average in the option and have a 2.20 cumulative average at the time of application for student teaching (February 15 of junior year). Further, all music education students must have passed the departmental piano proficiency exam before their student-teaching semester. Techniques and methods courses must include MUED 545 (strings), 741 (choral), 747 (woodwinds), 749 (brass), and 751 (percussion).

A public performance is required during the senior year. For students in the performance options this must be a full recital; for those in theory, a lecture, lecture-recital, or a recital including at least one original composition; for those in music education, a half recital is a minimum.

The following shows a year-by-year breakdown of required courses for options 1–6.

Option 1—Piano

Freshman Year: general education requirements (4 courses); MUSI 471-472 (6 credits); MUSI 473-474 (2 credits); MUSI 542 (8 credits).
Sophomore Year: general education requirements (4 courses); MUSI 571-572 (6 credits); MUSI 573-574 (2 credits); MUSI 542 (8 credits).
Junior Year: general education requirements (2 courses); MUSI 542 (8 credits); MUSI 501-502 (6 credits); MUSI 771-772 (4 credits); MUSI 455 (1 credit).
Senior Year: MUSI 542 (8 credits); MUSI 455 (1 credit); MUSI 735 (3 credits); two 3-credit courses elected in advanced theory and literature; two 4-credit courses elected outside the Department of Music.

Option 2—Organ

Freshman Year: general education requirements (4 courses); MUSI 471-472 (6 credits); MUSI 473-474 (2 credits); MUSI 544 (8 credits).
Sophomore Year: general education requirements (4 courses); MUSI 571-572 (6 credits); MUSI 573-574 (2 credits); MUSI 544 (8 credits).
Junior Year: general education requirements (2 courses); MUSI 544 (8 credits); MUSI 501-502 (6 credits); MUSI 771-772 (4 credits); MUED 540 (2 credits); MUED 741 (2 credits).
Senior Year: MUSI 544 (8 credits); two 4-credit courses in liturgical music, organ literature, repertoire, and hymnology; two 3-credit courses in music literature and/or advanced theory; two 4-credit courses elected outside the Department of Music.

Option 3—Voice

Freshman Year: general education requirements (4 courses); MUSI 471-472 (6 credits); MUSI 473-474 (2 credits); MUSI 541 (8 credits); MUSI 542 (2 credits); Music Laboratory—Choral (2 credits).
Sophomore Year: general education requirements must include a foreign language (4 courses); MUSI 571-572 (6 credits); MUSI 573-574 (2 credits); MUSI 541 (8 credits); MUSI 542 (2 credits); Music Laboratory—Choral (2 credits).
Junior Year: general education requirements (2 courses); MUSI 541 (8 credits); MUSI 542 (2 credits); MUSI 501-502 (6 credits); a second foreign language—German, French, or Italian (8 credits); Music Laboratory—choral and/or opera workshop (4 credits).
Senior Year: One course from MUSI 771 (2 credits), 781, or 782 (3 credits); MUSI 541 (8 credits); MUSI 542 (2 credits); two 3-credit courses in music literature and/or advanced theory; Music Laboratory—choral ensemble and/or opera workshop (4 credits).

Option 4—Strings, woodwinds, brass, or percussion

Freshman Year: general education requirements (4 courses); MUSI 471-472 (6 credits); MUSI 473-474 (2 credits); Performance Study—major instrument (8 credits); MUSI 542 or 467 (2 credits); Music Laboratory—instrumental (2 credits).
Sophomore Year: general education requirements (4 courses); MUSI 571-572 (6 credits), MUSI 573-574 (2 credits); Performance Study—major instrument (8 credits); MUSI 542 or 467 (2 credits); Music Laboratory—instrumental (2 credits).
Junior Year: general education requirements (2 courses); Performance Study—major instrument (8 credits); MUSI 501-502 (6 credits); MUSI 751-752 (4 credits); Ensemble (2 credits); Music Laboratory—instrumental (2 credits).
Senior Year: One course from MUSI 771 (2 credits), 781, or 782 (3 credits); Performance Study—major instrument (8 credits); two 3-credit courses in music literature and/or advanced theory; two 4-credit courses elected outside the Department of Music; Music Laboratory—instrumental (2 credits); Ensemble (2 credits).

Option 5—Theory (composition)

Freshman Year: general education requirements (4 courses); MUSI 471-472 (6 credits); MUSI 473-474 (2 credits); Performance Study—brass (1 credit) and woodwind (1 credit) or Techniques and Methods (2 credits); MUSI 542 (2 credits); Performance Study in major instrument (1 credit/semester).
Sophomore Year: general education requirements (4 courses); MUSI 571-572 (6 credits); MUSI 573-574 (2 credits); MUSI 542 (2 credits); MUSI 501-502 (6 credits); Performance Study—strings (1 credit) and percussion (1 credit) or Techniques and Methods (2 credits); Performance Study in major instrument (1 credit/semester).
Junior Year: general education requirements (2 courses); MUSI 771-772 (4 credits); MUSI 775-776 (6 credits); MUSI 779 (3 credits); MUSI 781, 782 (6 credits); MUSI 542 (2 credits); Performance Study in major instrument (1 credit/semester).
Senior Year: MUSI 773 (2 credits); MUSI 777 (6 credits); MUSI 542 (2 credits); two 3-credit courses in music literature; two 4-credit courses elected outside the Department of Music; Performance Study in major instrument (1 credit/semester).

Option 6—Music Education

Freshman Year: general education requirements (4 courses); MUSI 471-472, Theory I (6 credits); MUSI 473-474, Ear Training I (2 credits); MUSI 467 or 542, piano (1 credit/semester); MUED 545, string techniques (2 credits); MUED 751, percussion techniques (2 credits); Performance Study in major instrument (1 credit/semester); Performing Ensemble (two 1-credit courses). Total credits: 34.
Sophomore Year: general education requirements (1 course); EDUC 500* (4 credits); MUSI 571-572, Theory II (6 credits); MUSI 573-574, Ear Training II (2 credits); MUSI 501-502, music history (6 credits); MUSI 467 or 542, piano (1 credit/semester); MUED 747, woodwind techniques (2 credits); MUED 749, brass techniques (2 credits); Performance Study in major instrument (1 credit/semester); Performing Ensemble (three 1-credit courses). Total credits: 33.
Junior Year: general education requirements (3 courses); EDUC 700-701 (8 credits); MUSI 779, Orchestration (3 credits); MUSI 751-752, Conducting Methods (4 credits); MUED 741, choral techniques (2 credits); MUED 790, elementary school music (3 credits); Performance Study in major instrument (1 credit/semester); Performing Ensemble (two 1-credit courses). Total credits: 36.
Senior Year: general education requirements (1 course); EDUC 705 (2 credits); one course from MUSI 701–735, music history (3 credits)**; MUSI 781, Analysis: Form and Structure (3 credits); MUED 791, secondary school music (3 credits); Performance Study in major instrument: Recital (2 credits); Performance Ensemble (1 credit); EDUC 694, student teaching (8 credits); MUED 792, Seminar in Music Teaching (2 credits). Total credits: 28.

* EDUC 500 may be taken either semester of the second year. However, the music education methods course that covers the student's major instrument should be taken prior to enrolling in EDUC 500.

**Music education electives may include MUED 742, choral techniques II (2 credits); MUED 748, double reeds (2 credits); and MUED 795, Special Studies: Jazz Techniques or Marching Band Techniques (2 credits). MUSI 782, Analysis: Form and Structure, or MUSI 771, Counterpoint, may be substituted for MUSI 781.

Minor in Music

All students minoring in music must complete a minimum of 20 credits of coursework in music, of which the following are required: MUSI 471-472, MUSI 473-474, MUSI 501-502. MUSI 411-412 may be substituted for MUSI 471-472 and MUSI 473-474.

Philosophy

(For descriptions of courses, see page 164.)

Philosophy has always been the heart of liberal education, deepening and enriching the lives of those who pursue it. It is also excellent preparation for a variety of vocational and professional endeavors.

The Philosophy Major

The following courses constitute a core required of all majors: PHIL 412, 500, 530, 570, 574, 575. Majors must take a total of ten philosophy courses. Majors must take at least two courses at the 700 level and at most two courses (including 412) at the 400 level. At least one course must concentrate on major works of twentieth-century, continental philosophy, and at least one course must concentrate on major works of twentieth-century, Anglo-American philosophy. Courses used to satisfy requirements for the major may be used to satisfy general education requirements. PHIL 495, 795, and 796 normally do not count toward fulfilling major requirement credits; exceptions may be granted by special permission.

Special-Interest Program

Students may add to the above major a special-interest program of value in planning for postgraduate education or entry into such areas as law, medicine, business, education, theology, or social work. Special advisers are prepared to provide informal counsel to philosophy majors interested in these areas.

Graduate Preparatory Emphasis

This emphasis is strongly recommended for students who plan to do graduate work in philosophy. Beyond the ten program courses, such students should select, with their advisers' approval, two additional philosophy courses above the 400 level, for a total of twelve courses. One of these should be PHIL 550.

Departmental Commendation

Students accepted for departmental commendation will register for PHIL 699 (usually during the second semester of the senior year) and will write, under the guidance of an adviser, an original paper in philosophy. If completed successfully, students will receive a letter of commendation.

Philosophy Minor

Any five philosophy courses constitute a minor (PHIL 495, 795, 796 with special approval only).

Five-Year, Dual-Degree Program in Philosophy and Business Administration

The dual-degree program permits students to earn both a B.A. in philosophy and an M.B.A. in five years instead of the normal six. Students must meet all requirements for both the philosophy major and the M.B.A. program offered by the Whittemore School of Business and Economics. A maximum of 16 credits may be counted toward both degrees. Students interested in this program should consult the departmental adviser to the program early in their sophomore year.

Political Science

(For descriptions of courses, see page 173.)

The study of government and politics, to which the courses and seminars of the Department of Political Science are devoted, includes the development of knowledge of political behavior by individuals and groups as well as knowledge about governments: their nature and functions; their problems and behavior; and their interactions—at the national and international levels and at the local, state, and regional levels.

Much of the learning offered by the Department of Political Science can also be regarded as essential for good citizenship, since political knowledge helps to explain both the formal institutions by which societies are governed and the issues that encourage people toward political interest and political action. In addition, such learning is especially valuable to students planning to enter local or national government or other public service, including foreign service, and it will be of great help to those who intend to study law and enter the legal profession. For teaching, particularly at the college level, and for many types of government service, graduate work may be indispensable, and an undergraduate major in political science will provide the most helpful foundation for further study in the field. Such an emphasis will also be valuable for students seeking careers in journalism, international organizations, and the public affairs and administrative aspects of labor, financial, and business organizations.

The major program in political science consists of at least nine courses (36 credits) and not more than twelve courses (48 credits) to be distributed in the following way:

1. Two 400-level courses. These introductory courses should be completed by majors by the end of the sophomore year.
2. Six 500- and/or 600-level courses. Of these, at least one shall be chosen from each of the four fields in which the department's courses are organized: American politics, comparative politics, international politics, and political thought.
3. One 700-level course.

Students are required to take two 400-level political science courses and one 500-level political science course before they can declare a political science major. Of course, these courses (if C– or better) will count toward the major.

Internships and Advanced Study

In addition to the courses regularly offered, the department will have available selected topics, advanced study in political science, and internships. Interested students should check with the department office to learn of the offerings for a given semester.

The department also offers several internship opportunities giving students experience in various aspects of government, policymaking, and the legal system at the local, state, and national levels. Students need not be political science majors, but a student must have taken certain course prerequisites for each kind of internship. In addition, students must have junior or senior standing and normally have a 3.00 average or higher to be eligible for consideration. Washington placements are made either through the Department of Political Science or through the Washington Center for Learning Alternatives; major credit must be arranged through the department.

Psychology

(For descriptions of courses, see page 176.)

The psychology major provides students with a broad education, while also allowing some specialization. The program exposes students to the scientific study of behavior and encourages an increased understanding of the behavior of humans and animals.

Students who wish to declare psychology as a major following admission to the University should consult with the department's academic counselor for application procedures and criteria.

Students majoring in psychology must complete 36 credits with a minimum grade of C– in each course and a 2.00 overall average in all major requirements. Students with a first major in psychology may not use any psychology courses to fulfill general education requirements. The distribution of the major requirements is as follows:

1. PSYC 401, 402, and 502
2. Two 500-level courses other than PSYC 502. Of these, one must be from group (a) below and one from group (b):
   a) PSYC 512, 513, 521, 522, 531
   b) PSYC 552, 553, 561, 571, 581, 582
3. Three 700-level courses. Of these at least one must be taken from each of the following groups:
   a) PSYC 702, 704, 705, 710, 711, 712, 713, 721, 723, 731, 732, 741 (may repeat but not duplicate content)
   b) PSYC 752, 755, 762, 770, 771, 780, 783, 785, 791 (may repeat but not duplicate content), 793, 794
4. One additional course from courses approved for major credit. Note: a maximum of 4 credits of PSYC 793, 794, and 795 combined may be applied toward the 36 credits required for the major.

Transfer students who elect to major in psychology must complete at least 18 credits in the program at UNH to qualify for the degree in psychology. Transfer students must earn a total of 36 approved credits for completion of the psychology major. The distribution of these credits will be determined by the department's academic counselor. Transfer students should note that courses are allotted only the number of credits granted by the original institution (after adjustments for semester-hour equivalents). Thus, students transferring from an institution at which courses carry less than 4 credits each must make up for any credit deficit created by acceptance of transfer credits into the psychology major.

Specific course selections should be discussed with advisers. Exceptions to the requirements for the major require a petition to the department.

Psychology majors planning to go on to graduate study in psychology should include advanced research (PSYC 702, 704, or a research-based independent study) among their courses.

The minor in psychology consists of five psychology department courses (20 credits), including PSYC 401 and at least two courses at the 500 level or above. All courses to be applied to the minor must be approved by the psychology department.

See the department secretary for further details on the major or minor in psychology.

Advising System

Students who enter the University as psychology majors are considered "provisional majors" and are advised in the University Advising Center until they complete PSYC 401 and 402, at which time they can confirm their major. "Provisional majors" are accorded all the rights and privileges of any psychology major. Undergraduate advising in the department is conducted jointly by the department's academic counselor and the full-time faculty. The academic counselor has primary responsibility for advising confirmed and newly declared freshman and sophomore psychology majors and is the initial contact for all majors in a state of transition (readmitted, transfer, newly declared students, etc.). The academic counselor assists students in all phases of educational planning and decision making, including preregistration, long-range academic planning, degree and program requirements, and career selection and planning. Junior and senior psychology majors are assigned to a faculty adviser with appropriate consideration for student preferences. The advising relationship with a faculty member is designed to encourage refining career and educational decisions.

Five-Year, Dual-Degree Program in Psychology and Business Administration

The dual-degree program permits students to earn both a B.A. in psychology and an M.B.A. in five years instead of the normal six. Students must meet all requirements for both the psychology major and the M.B.A. program offered by the Whittemore School of Business and Economics. A maximum of 16 credits may be counted toward both degrees. Candidates for the five-year, dual-degree program typically have a background of work experience in addition to a solid academic record. Students interested in this program should consult with the departmental adviser to the program early in their sophomore year.

Undergraduate Awards for Majors

Each spring the faculty chooses psychology undergraduates as the recipients of the following awards: the Herbert A. Carroll Award for an outstanding senior in psychology, the George M. Haslerud Award for an outstanding junior in psychology, and the Fuller Foundation Scholarship for an outstanding junior in psychology with demonstrated interests in clinical psychology. Psychology majors with at least a 3.00 grade-point average are eligible for these awards. Faculty nominate students from the eligibility list and final selection of recipients is made by vote of the full-time psychology faculty.

Honors Program in Psychology

The Department of Psychology sponsors an honors program for outstanding students in the major. Students may apply to the honors program in psychology in their sophomore or junior year. Eligibility criteria include:

1. Overall G.P.A. of 3.20 or above
2. Completion of PSYC 401, 402, and 502 with a grade of B or above in each

Requirements of the program include:

1. Three 700-level psychology honors courses or equivalent
2. PSYC 797, Senior Honors Tutorial (fall)
3. PSYC 799, Senior Honors Thesis (spring)

Students interested in applying to the honors program should contact the department's academic counselor.

Undergraduate Research Conference

The Department of Psychology sponsors the annual George M. Haslerud Undergraduate Research Conference each spring. Undergraduates are invited to submit empirical or theoretical papers for presentation at the conference. Contact the department's academic counselor for more information.

Russian

(For descriptions of courses, see page 180.)

The Russian major provides students with an opportunity to study one of the world's most important languages, its culture, and its literature. In addition to the intrinsic value of Russian as a liberal arts experience, the Russian major leads to a number of careers, such as teaching, translation and interpreting, government, and foreign service. It is also a valuable asset in preparing for careers in law, economics, and international trade, and it can serve as a dual major with business administration, international affairs, the natural and physical sciences, and other liberal arts fields such as English, history, political science, sociology, philosophy, theatre and communication, linguistics, and other foreign languages.

The Russian major consists of a minimum of 40 credits above RUSS 504. Specific course requirements are RUSS 505-506, RUSS 521 or 522, RUSS 425, RUSS 631-632, RUSS 691, RUSS 733, and RUSS 734, plus an additional 4 credits from among other offerings in Russian.

The minor in Russian consists of a minimum of 20 credits above RUSS 402 and must include RUSS 503-504 and RUSS 631-632, RUSS 691, or RUSS 733.

Students wishing to major in Russian should contact Aleksandra Fleszar in 9 Murkland Hall.

Sociology

(For descriptions of courses, see page 182.)

Sociology involves the study of human beings in social contexts. It focuses on the ways in which social relationships among individuals, groups, and organizations are created and maintained. It also examines the causes and consequences of change in these social units.

Major issues studied in sociology include socialization, social psychology, deviance and social control, formal organizations, equality and inequality within society, and social structure. Specific phenomena are also studied, including the family, health and illness, gender, race and ethnic relations, and criminology. Central to the program is the acquisition of skills in methods of social research, statistical analysis, and sociological theory.

Majors must complete a minimum of 36 semester credits with grades of C– or better in each of these courses and a grade-point average of 2.00 or better in sociology courses. SOC 400, 502 (or acceptable substitutes), 599, 601, and 611 or 612 are required; majors must take 599 no later than the junior year. At least two of the additional major courses must be at the 600 or 700 level (excluding 795 or 796).

It is possible to select a concentration within the major by taking electives in a specific area, such as social psychology, aging, or criminal justice. Conjoint minors (allowing double-counting of one or two courses) are available for justice studies, gerontology, American studies, women's studies, etc.; there is even the possibility of second majors (with the same double-counting provision). Students interested in social work or in high school teaching can develop programs in conjunction with the appropriate departments. The departmental honors program is particularly recommended for those anticipating graduate study.

Students interested in majoring in sociology should consult with the chairperson of the Departmental Committee for Undergraduate Studies in Sociology for guidance in selecting a concentration. It is the responsibility of all sociology majors to obtain the latest information from the department office.

A minor consists of any five 4-credit courses in sociology with a C– or better in each course and a grade-point average of 2.00 or better in such courses.

Spanish

(For descriptions of courses, see page 184.)

The major in Spanish is offered by the Department of Spanish and Classics. It is designed for students who wish to acquaint themselves more thoroughly with the language, culture, and literature of the Spanish-speaking peoples. In addition, the department offers courses in Portuguese.

Students who major in Spanish may prepare themselves for a variety of fields in which proficiency in the Spanish language and knowledge of Hispanic cultures are desirable. Such fields might include international relations, business administration, government work, social service, and communications. In addition, students can prepare to teach Spanish at the elementary and secondary levels and in bilingual education programs through the foreign language teacher education program. The undergraduate major also provides a basis for graduate study in preparation for scholarly research and teaching at the college level. When combined with coursework or a dual major in other disciplines, the major prepares students for work in Spanish-speaking areas of the world as well as in bilingual regions of the United States.

The UNH study abroad program in Granada, Spain, open to majors and nonmajors, offers students the opportunity to live and study abroad for a semester or a full academic year. Financial aid is available for eligible students. Contact the departmental program directors for further information.

The major consists of a minimum of 40 credits. Specific course requirements are (1) language and culture: 525 or 526, 601, 631, and 632; (2) introductory literature: 650, and either the sequence 651/652 or 653/654; (3) three courses taught in Spanish at the 700 level. The Spanish minor consists of 20 credits above 501, including 631 and 632.

Interested students should talk to the chairperson for Spanish or an adviser in the department.

Theatre and Dance

(For descriptions of courses, see pages 119 and 186.)

The theatre program offers a variety of opportunities to students interested in the performing arts. In a given year, the department offers eight or more core curriculum productions that include several plays, a musical, a dance concert, theatre-in-education productions, and an ArtsReach touring production. Because the department concentrates on undergraduate education, the students have many opportunities to perform, design, choreograph, and direct during their four-year period. Faculty contacts with area theatres, touring, and stock companies afford off-campus experiences in the junior and senior years.

The theatre major emphasizes the strengths of general theatre training within a broad liberal arts context, with opportunities for specialization in acting, directing, choreography, design and technical theatre, playwriting, theatre-in-education, youth drama, storytelling, puppetry, secondary school certification, ballet, theatre (jazz and tap)

dance, modern dance, musical theatre, and touring theatre, not to mention the possibility for integration with other departments. Students interested in performance, technical, and historical aspects will find opportunities for personal and preprofessional growth. The program affords means for independent study and internships, application of basic theories in special projects, and for active personal involvement in lecture and laboratory classes.

In addition to general liberal arts preparation, four specific course sequences are available within the theatre major: (1) courses leading to a major that when combined with requirements of the Department of Education qualify students for secondary school certification; (2) courses leading to a major that when combined with requirements of the Department of Education prepare students for elementary school certification with an undergraduate specialization in youth drama; (3) courses leading to a theatre major with a concentration in dance (ballet, modern, and theatre dance); and (4) courses emphasizing musical theatre.

The basic theatre major allows students to explore a variety of areas. In the freshman and sophomore years, the student should enroll for at least two theatre courses per semester and two general education courses per semester. Students meet with the chair of the department, who assigns advisers appropriate to the area of interest.

Course and Major Requirements
General Sequence
(Total credits, 46)

1. Required of all students
THEA 435, Introduction to Theatre, *or* 441, Exploring Theatrical Process; 653, Performance Project, *or* 654, Scenic Arts Project; 689A-F, Theatre/Dance Practicum; 697, Junior Seminar; and 698, Senior Project (Thesis).

2. Theory/History
Total of 8 credits chosen from: THEA 436*, History of Theatre I, *or* 438*, History of Theatre II; 450, History of Musical Theatre in America; 520, Creative Drama; 541, Arts Administration; 621, Education through Dramatization; 627, Methods of Education through Dramatization; 693, Theatre Management; 741, Play Reading; or 750, Writing for Performance.

3. Design/Technical
Total of 8 credits chosen from: THEA 458, Costume Construction; 459*, Stagecraft; 475, Stage Makeup; 546, Costume Design for the Theatre; 547, Stage Properties; 548, Stage Lighting Design and Execution; 583, Puppetry; 592, Special Topics in Theatre (Costuming, Stage Management); or 652, Scene Design.

4. Performance
Total of 8 credits chosen from: THEA 457, Oral Interpretation; 549, Voice and Diction I; 550, Voice and Diction II; 551*, Acting I; 552, Acting II; 622, Storytelling, Story Theatre, and Involvement Dramatics; 624, Musical and Theatre for Youth; 632, The Interpretation of Shakespeare in the Theatre; 655, Musical Theatre Workshop; 657, Directing; 755, Advanced Musical Theatre; 758, Acting III; or 768, Chamber Theatre.

5. Advanced Courses
Total of 8 credits from any 600- or 700-level course chosen from those listed in 1 through 4 above or THEA 691, Field Experience; 781, Theatre Workshop for Teachers; 782, Advanced Theatre Workshop for Teachers; or 795, Independent Study.

Secondary Teacher Education
(Total credits, 53)

These courses lead to a major that when combined with the requirements of the Department of Education qualifies students for acceptance into the M.A.T. program leading to secondary school certification. Students are required to take at least one methods course specifically in the teaching area, and they need a minor in a traditional liberal arts discipline (e.g., English, history, sociology). In the fifth year of the program, students must take either Performance Project, Scenic Arts Project, or Senior Project. This requirement is part of the student's internship, with additional credit being awarded.

EDUC 500, Exploring Teaching
CMN 455, Introduction to Mass Communication
CMN 500, Public Speaking
CMN 507, Introduction to Rhetoric
THEA 435, Introduction to Theatre
THEA 436, History of Theatre and Its Drama I *or*
THEA 438, History of Theatre and Its Drama II
THEA 457, Oral Interpretation
THEA 551, Acting I
THEA 459, Stagecraft
THEA 575, Scenic Design
THEA 657, Directing
THEA 689A, Theatre/Dance Practicum
8 credits in specialization area (communication or theatre)

Youth Drama and Elementary Education Certification
(Total credits, 59)

1. Required of all students: THEA 441, Exploring Theatrical Process, *or* 435, Introduction to Theatre; 457, Oral Interpretation; 459, Stagecraft; 520, Creative Drama; 583, Puppetry; 621, Education through Dramatization; 622, Storytelling, Story Theatre, and Involvement Dramatics; 624, Musical and Theatre for Youth; 653, Performance Project; 689A, Theatre/Dance Practicum; 697, Junior Seminar; 698, Senior Project
2. Theatre dance or modern dance: 4 credits
3. Practicum: EDUC 500, Exploring Teaching
4. Education: 4 credits chosen from: EDUC 700, Educational Structure and Change; 701, Human Development and Learning: Educational Psychology; 703F, Teaching Elementary School Science; 703M, Teaching Elementary School Social Studies; 705, Alternative Perspectives in the Elementary Schools; or 706, Introduction to Reading Instruction
5. Mathematics: 4 credits chosen from: MATH 621, Number Systems for Teachers; MATH 622, Geometry for Teachers; MATH 623, Topics in Mathematics for Teachers; EDUC 703, Alternative Teaching Models; EDUC 706, Introduction to Reading Instruction; or EDUC 741, Exploring Mathematics with Young Children

Dance
(Total, 54 credits)

1. Required of all students: THEA 441, Exploring Theatrical Process; 459, Stagecraft; 653, Performance Project, *or* 654, Scenic Arts Project; 689A and B, Theatre/Dance Practicum; 697, Senior Seminar; 698, Senior Project; and DANC 487, The Dance

* Required in each group.

2. Total of 8 credits from: DANC 633, Dance Composition I; 640, Labanotation; or 732, Choreography
3. Total of 8 credits from: THEA 546, Stage Costume Design; THEA 548, Stage Lighting Design; THEA 551, Acting I; THEA 655, Musical Theatre; THEA 755, Advanced Musical Theatre; ARTS 431, Visual Studies; ARTS 572, Art of the Age of Humanism; ARTS 573, Art of the Modern World; MUSI 411-412, Fundamentals of Music History; MUSI 709, Music of the Romantic Period; MUSI 711, Music of the 20th Century; PHIL 421, Philosophy of the Arts
4. Total of 16 credits from: DANC 461, Modern Dance I; 561, Modern Dance II; 661, Modern Dance III; 462, Ballet I; 562, Ballet II; 662, Ballet III; 463, Theatre Dance I; 563, Theatre Dance II; 663, Theatre Dance III; 684, Special Topics (Dance Technique and Injury, Partnering, Pedagogy); 576, Pointe; 597, Dance Theatre Performance

Musical Theatre
(Total, 60 credits)
1. Required of all students: THEA 441, Exploring Theatrical Process, *or* 435, Introduction to Theatre; 411, Fundamentals of Music Theory; 450, History of Musical Theatre; 459, Stagecraft; 549, Voice and Diction I; 551, Acting I; 653, Performance Project; 655, Musical Theatre Workshop; 755, Advanced Musical Theatre; 689A and B, Theatre/Dance Practicum; 697, Senior Seminar; 698, Senior Project
2. Total of 4 credits from: THEA 436 *or* 438, History of Theatre I *or* II; DANC 487, The Dance
3. Total of 8 credits of theatre dance
4. Total of 4 credits from: MUSI 441, Concert Choir; MUSI 448, Opera Workshop; MUSI 461, Vocal Ensemble; MUSI 467, Functional Piano; MUED 540, Beginning Techniques in Voice
5. An additional 8 credits in theatre, music, or dance. The student and adviser will select courses appropriate to the needs of each student.

Women's Studies

(For descriptions of courses, see page 189.)

Women's studies provides students with an understanding of the status of women in various cultures and historical eras. Students learn the use of gender as a category of analysis and increase their knowledge of women's contributions to many fields. Women's studies courses offer students critical perspectives on such basic questions of the social order as assumptions about gender roles and gender identity.

A major or minor in women's studies prepares students for careers where the changing roles of women are having a perceptible impact. Women's studies graduates go on to law school and graduate school in a variety of disciplines. Some have taken positions with social change or family service agencies, while others have found work in such fields as communications, education, affirmative action, and personnel.

Women's Studies Major
For the women's studies major, students must complete 40 credits of women's studies courses (or 32 in the case of a double major) with grades of C– (1.67) or better and an overall grade-point average of 2.00 or better. These courses must include the following three: 1) WS 401, Introduction to Women's Studies; 2) WS 632, Feminist Thought; and 3) WS 798, Colloquium in Women's Studies. WS 401 and 798 are normally taken at the beginning and end of the course sequence, respectively. Electives are chosen in consultation with a faculty adviser principally from other women's studies and cross-listed departmental offerings.

Other women's studies courses are WS 595, Special Topics in Women's Studies; WS 795, Independent Study; and WS 796, Advanced Topics in Women's Studies.

Departmental offerings include the following regularly repeated courses:

ARTS 487D, Themes and Images in Art: Major Mythic Images of Women
ARTS 690, Women Artists of the Nineteenth and Twentieth Centuries
CMN 567, Images of Gender in the Media
CMN 583, Gender and Expression
ECON 698, Topics in Economics: Women in Economic Development
ENGL 585, Introduction to Women in Literature
ENGL 586, Introduction to Women Writers
ENGL 685, Women's Literary Traditions
ENGL 785, Major Women Writers
FS 645, Family Relations
HIST 565, Women in Modern Europe
HIST 566, Women in American History
NURS 595, Women's Health
SOC/ANTH 625, Female, Male, and Society

Students may also select from other courses that are offered as special topics by the departments. In the past, such offerings have included the following: ANTH 697, Women in the Middle East; CMN 616, Women and Film; EDUC 410, Women and Education; FREN 525, French Women: Subject and Object; PHIL 510, Philosophy and Women.

Electives must show a balance between arts and humanities/social sciences and be distributed between upper (600 and 700) and lower (400 and 500) level courses; no more than four electives may be from the same department. Strongly recommended are a practicum or internship course and a course that focuses on women of color or cross-cultural perspectives.

Women's Studies Minor
The minor consists of 20 credits of women's studies courses. These must include WS 401, Introduction to Women's Studies, and WS 798, Colloquium in Women's Studies, normally taken at the beginning and end of the course sequence, respectively. In between, students should select other women's studies courses or courses from departmental offerings that have been designated women's studies courses or that have the approval of the women's studies coordinator.

Students who wish to major or minor in women's studies should consult with the coordinator, 304 Dimond Library, (603) 862-2194.

College of Life Sciences and Agriculture

Thomas P. Fairchild, Dean
Robert O. Blanchard, Associate Dean
Emery P. Booska, Assistant Dean

Department of Animal and Nutritional Sciences
Department of Biochemistry and Molecular Biology
Department of Entomology
Department of Microbiology
Department of Natural Resources
Department of Plant Biology
Department of Resource Economics and Development
Department of Zoology

Bachelor of Arts
Entomology
Plant Biology
Zoology

Bachelor of Science
Adult and Occupational Education
Animal Sciences
- Bioscience and Technology
- Equine Sciences
- Preveterinary Medicine

Biochemistry
Biology
- Ecology and Evolutionary Biology
- General Biology
- Marine and Freshwater Biology
- Molecular, Cellular, and Developmental Biology

Community Development
Dairy Management
Entomology
Environmental Conservation
- Environmental Affairs
- Environmental Science

General Studies
Horticulture and Agronomy
Microbiology
Nutritional Sciences
Plant Biology
Resource Economics
Soil Science
Tourism
Water Resources Management
Wildlife Management
Zoology

Bachelor of Science in Forestry
Forestry
- Forest Management
- Forest Science

The objectives of the College of Life Sciences and Agriculture are to give students a fundamental education in the biological, physical, and social sciences and to introduce them to the arts and humanities. In addition, advanced technical and professional courses are offered to prepare students for graduate school or entry-level positions in areas concerned with improving the quality of life. Preparation can vary from fundamental studies of cancer cells to community service planning, resource protection to genetic engineering, and career teaching to molecular biology and biotechnology.

A blend of the basic and applied aspects of life sciences and agriculture, coupled with careful selection of supportive courses, ensures graduates the background and experiences necessary to be competitive in the job market. Potential employers include federal, state, and local governments; consulting firms; and industrial organizations. Graduates are employed as watershed, soil, and natural resource managers; associates in biomedical and agricultural research laboratories; marketing analysts and extension specialists; nutrition supervisors and environmental regulators; and information educators and communications experts.

Community governments employ graduates as service planners and land-use specialists, teachers in traditional and vocational education, public health technicians, and urban pest control specialists.

Positions are available in private and commercial organizations in production agriculture, food processing, landscaping, agribusiness, sales, and private planning. Graduates may also pursue entrepreneurial careers as greenhouse, nursery, farm, and natural resource managers; or as consultants, arborists, and environmental planners.

For those graduates with international aspirations, the Peace Corps and the Foreign Agriculture Service employ farm production experts, soil and water managers, market analysts, agricultural engineers, teachers, plant and animal breeders, and nutrition specialists.

Additionally, departments prepare students for advanced study in their chosen field of interest where graduate study is required for attaining their career goals.

Degrees

The college offers three undergraduate degrees: the bachelor of arts, the bachelor of science, and the bachelor of science in forestry. Some of the courses prescribed in these degree programs partially fulfill the general education requirements. Students should see their adviser for specific information.

Bachelor of Arts

The bachelor of arts degree is available in entomology, plant biology, and zoology. Students are required to satisfy University requirements, which include 128 credits, a 2.00 cumulative grade-point average, general education requirements, and a foreign language requirement (see page 16 for B.A. degree requirements). Check individual departmental listings for specific major requirements.

Bachelor of Science

The bachelor of science degree is available in all departments or programs except forestry. University requirements are the same as for the bachelor of arts degree, except that a foreign language is not required and minimum acceptable grades may differ in some programs. Check individual departmental or program listings for specific major requirements.

Bachelor of Science in Forestry

The bachelor of science in forestry is a professional, designated degree available to students majoring in forestry. (See page 46 for major requirements.)

Five-Year Program: B.S.-M.B.A.
The College of Life Sciences and Agriculture and the Whittemore School of Business and Economics offer a combined five-year program leading to a B.S. in plant biology and an M.B.A. degree. Information about the program can be obtained from the Department of Plant Biology or from the undergraduate counselor in the Whittemore School.

Advising System

A member of the faculty whose area of interest is closely related to the student's is appointed as an adviser to assist the undergraduate in planning his or her academic program. Further advising is also available in the dean's office, 201 Taylor Hall.

Undeclared Status

Students may select a major upon entering the college or may wait until registration for the sophomore year. Students who are uncertain about choosing a specific major may remain undeclared during their freshman year. In most cases they should take the following courses, after which they should be ready to declare a major:

Fall	Spring
CHEM 403	CHEM 404
BIOL 411	BIOL 412
General education requirement	General education requirement
An introductory course in any department in the college	RECO 411*

*or other elective course to meet a general education requirement.

Undeclared freshmen should explore possible majors by taking courses in the areas or programs that interest them most. They should talk to faculty, students, and their adviser concerning requirements, job opportunities, etc., in the various programs and should be prepared to declare a major when they preregister for the first semester of the sophomore year.

Combined Programs of Study

In addition to pursuing a single major, students may combine programs of study as follows:

Minors: See page 17; see also page 19 and below.
Second Majors: See page 17.
Dual-Degree Programs: See page 16.
Student-Designed Majors: See page 85.
Other combined and interdisciplinary opportunities: See page 82.

Interdisciplinary Programs

Interdisciplinary Minor in Plant Pest Management

The interdisciplinary minor in plant pest management provides a broad but comprehensive foundation in the concepts and practices employed in managing the major groups of pests that affect agricultural crops. It covers both the integrated pest management systems used in modern agriculture in developed countries and the agricultural practices used in developing countries. It is designed for students majoring in plant biology or entomology, with career interests in commercial agriculture, agricultural industries, agricultural consulting, USDA regulatory service, economic entomology, plant pathology, integrated pest management, or extension. It also provides a strong background for students interested in pursuing advanced degrees required for these areas.

Further information may be obtained from the chairperson of each participating department or any instructor teaching one of the courses. The minor consists of five courses as outlined below:

Required:
PBIO 651, Plant Pathology
PBIO 706/708, Biology of Weeds
ENTO 721, Principles of Biological Control
ENTO 726, Integrated Pest Management

Select one:
ENTO 402, Introductory Entomology
ENTO 503, Principles of Applied Entomology
ENTO 506, Forest Entomology

Genetics Program

An undergraduate degree in genetics is not offered at the University of New Hampshire. In the Graduate School, the M.S. and Ph.D. degrees are offered in an interdepartmental genetics program, involving the departments of animal and nutritional sciences, biochemistry and molecular biology, natural resources, microbiology, plant biology, and zoology. For some of the courses offered in the program, see the genetics entry in the course descriptions of this catalog as well as other genetics courses offered by the cooperating departments within the genetics program. Students interested in preparing for graduate work in genetics at UNH or elsewhere should contact the chairperson of the genetics program early in their undergraduate careers for advice on courses.

General Science Certification

Students majoring in animal sciences, biochemistry, biology, entomology, environmental conservation, forestry, microbiology, plant biology, soil science, water resources management, wildlife management, zoology, or general studies may seek certification to teach science at the middle or junior high school level.

For further information, contact the coordinator of teacher education in the Department of Education.

Major Programs

Adult and Occupational Education

(For descriptions of courses, see page 100.)
The adult and occupational education program focuses on the preparation of students: as teachers of vocational/technical education, as participants in international agricultural education, as extension educators, and as adult educators concerned with human resource development.

This program complements a student major in technical subject matter within departments throughout the University and thus can serve as a viable dual major or minor.

Flexibility is maintained among individual programs, with credits allowed for qualified students through (1) the Occupational Competency Testing and Evaluation program, (2) internships in industry, (3) Cooperative Extension, and (4) within other informal educational settings. Opportunity

is provided for vocational teacher certification.

Students who desire to major or minor in adult and occupational education should consult with a member of the faculty of the program.

Students majoring in this program will normally concentrate in one of four areas, although programs for teacher education can be developed in other areas of vocational/technical education on an individual basis.

Areas of concentration are described below.

Agricultural Education Teacher Certification

This program prepares individuals for careers as teachers of agriculture. Individuals completing this concentration are eligible for state certification in New Hampshire and most other states. Recent occupational experience in the field of production agriculture or agribusiness is required for state certification.

Individuals are encouraged to complete a dual major in a technical agricultural field. For further information, contact David L. Howell.

AOE Required Courses	Credits
AOE 702, Concepts of AOE	4
AOE 650, Microcommunications	4
AOE 752, Youth Organizations	4
EDUC 750, Introduction to Exceptionality	4
AOE 791, Planning for Teaching	4
	20

Education Required Courses	
EDUC 500, Exploring Teaching	4
EDUC 700, Educational Structure and Change	4
EDUC 701, Human Development and Learning, *or* FS 525, Human Development	4
EDUC 705, Alternative Perspectives on the Nature of Education	4
EDUC 694, Supervised Teaching in AOE	8
	24

The technical agriculture courses are selected from the following areas: (1) animal science; (2) plant biology; (3) agricultural mechanization; (4) resource economics; (5) entomology; (6) forestry (5th-year program); (7) some courses from the Thompson School of Applied Science or similar out-of-state institutions may be appropriate.

Additional Programs

Programs for teacher education can be developed in other areas of vocational/technical education on an individual basis.

Trade and Industrial Teacher Certification

Trade and industrial education, with emphases in, but not limited to, building trades, mill carpentry, welding, and food service, is formulated in three categories of courses to fulfill degree requirements. The degree requirements are 44 credits in general education, 44 credits in professional education, and 40–50 credits in technical subject matter or documented recent occupational experience. Technical subject matter is culminated in a competency test where credit (up to 30 credits) is awarded for successful completion of a written and practical exam. The competency exam is used to evaluate a student's previous occupational experience, when appropriate. Recent occupational experience in the field of specialization is required for state certification. For further information, contact David L. Howell.

AOE Required Courses	Credits
AOE 702, Concepts of AOE	4
AOE 650, Microcommunications	4
EDUC 750, Introduction to Exceptionality	4
AOE 791, Planning for Teaching	4
	16

Required Education Courses	
EDUC 500, Exploring Teaching	4
EDUC 700, Educational Structure and Change	4
EDUC 701, Human Development and Learning, *or* FS 525, Human Development	4
EDUC 705, Alternative Perspectives on the Nature of Education	4
EDUC 694, Supervised Teaching in AOE	8
	24

Technical Courses

AOE 696, Field Experience
AOE 500, Occupation Competency Examination and Evaluation

International Agricultural Education

This program prepares individuals for careers in international agriculture. The Peace Corps; U.S. Agency for International Development; and private agencies, business, and industry would be possible overseas employment opportunities. For further information, contact David L. Howell.

AOE Required Courses	Credits
(27 credits minimum)	
AOE 702, Concepts of AOE	4
AOE 650, Microcommunications	4
EDUC 750, Introduction to Exceptionality	4
AOE 696, Field Experience	2–16
AOE 630, Development of Food and Fiber in Third World Countries	4
AOE 752, Youth Organizations	4
AOE 783, Conducting and Supervising Adult Education Programs	4

Technical Agriculture

(44 credits: one area should include 20 credits; each of the others, 8)

8–20 credits	Animal science
8–20 credits	Plant biology & soil science
8–20 credits	Agribusiness
8–20 credits	Agricultural mechanization

Recommended International Courses

IA 401, International Perspectives: Science, Business, and Politics
IA 501, North-South Issues in International Affairs
ANTH 500, Peoples and Cultures of the World
RECO 506, Population, Food, and Resource Use in Developing Countries
Foreign language

Adult Education

This program prepares students for careers with Cooperative Extension, industrial training, and within other informal educational settings. It includes opportunity for selected formal courses and for field experience valuable for the student's professional development. The most beneficial focus in this area may be a dual major or minor along with concentration in a technical subject matter field within the College of Life Sciences and Agriculture or within other colleges and schools of the University. For further information, contact David L. Howell.

AOE Required Courses	Credits
AOE 702, Concepts of AOE	4
AOE 650, Microcommunications	4
AOE 695, Investigations in AOE	2–4
AOE 696, Field Experience	2–16
AOE 783, Conducting and Supervising Adult Education Programs	4

Recommended Courses

CD 415, Community Issues and Perspectives	4
CD 710, Community Development Seminar	2–4
SOC 500, Introduction to Social Psychology	4
PSYC 401, Introduction to Psychology	4
RECO 504, Business Management for Natural Resource Firms	4
RECO 604, Financial Concepts for Natural Resource Firms	4

Animal Sciences

(For descriptions of courses, see page 101. See page 161 for description of Nutritional Sciences courses.)

The undergraduate animal sciences program at UNH provides students with fundamental and applied education in nutrition, reproduction, genetics, physiology, pathology, cell biology, and large animal management. Courses are offered in all areas of dairy and light horse production.

The Department of Animal and Nutritional Sciences is housed in Kendall Hall, a modern five-story animal research facility. This building houses the New Hampshire Veterinary Diagnostic Lab; an electron microscopy facility; and nutrition, physiology, and cell culture labs, all of which provide opportunities for students interested in basic animal sciences. The department maintains a light horse center and offers an equine program with courses in management, equine diseases, equine discipline, physical performance, and horsemanship specializing in dressage and combined training. Dairy facilities include housing for more than one hundred milking-age cows in the new $1.6-million Dairy Teaching and Research Center. Miniature swine are maintained at the Burley-Demerritt farm. Extensive poultry facilities also permit research and work experience in poultry science.

The animal sciences program offers two majors: animal science (with options in [1] equine sciences, [2] bioscience and technology, and [3] preveterinary medicine) and dairy management. In addition to satisfying the specific requirements of these majors or options, all animal science and dairy management majors must complete the University general education requirements.

The department also offers a program in nutritional sciences and dairy management. (See pages 48 and 45.)

The equine sciences option is intended to prepare students for a career in the equine industry. While the basic curriculum for this option provides students with the fundamental background in the equine sciences, preparation in a particular area of specialization is achieved by choosing courses from one of the following three areas of concentration: exercise sciences, equine industry equestrian management, or equine industry agribusiness management.

Students in the bioscience and technology option often specialize in nutrition, reproduction, genetics, or cell biology. This curriculum prepares students for advanced training in graduate school programs or in various medical professions; entry-level positions in biomedical, biotechnical, pharmaceutical, and other scientific companies; or technical positions in many research and medical units.

The preveterinary medicine option is designed to meet the academic requirements of most veterinary schools. Requirements may be met within three years allowing students to apply to veterinary school during their senior year. However, most students finish their senior year, thus allowing more time for electives, concentration in areas of secondary interest, and completion of graduation requirements.

Employers in agriculture prefer to hire an agricultural graduate with extensive knowledge in a related field (e.g., computer science) rather than a graduate in one of these areas with no knowledge of agriculture. Hence, animal science students are encouraged to obtain training in a field that complements study in animal sciences. Such areas may include cell biology, biotechnical skills, communications, computer science, education, or business. This is generally accomplished by either taking a concentration of courses or obtaining a minor in a "specialty" area. Attainment of sufficient training in a "specialty" area enhances opportunity for employment. A careers course is offered to help students select and prepare for a particular career area.

Development of optional career goals is important for preveterinary students. Admission to schools of veterinary medicine is highly competitive. Therefore, students in this option are urged to prepare for alternative careers as they complete preveterinary requirements.

All animal science majors are required to complete ANSC 406; CHEM 403-404; and ENGL 501. In addition, the requirements in one of the three following options must also be completed:

Equine Sciences Option

ZOOL 507-508; RECO 411 or ECON 402; RECO 528; ANSC 404, 609, 610, 612, 620, 622, 625, 697, 796 (or INCO 606B); two 700-level ANSC courses; and at least five courses from one of the following two groups: (A1.) Equine Industry Equestrian Management Group: ANSC 507, 604, 653-654; PHED 501; CMN 500 or MGT 580; RECO 501, 504; DCE 491-492 or CS 401. (A2.) Equine Industry Agribusiness Management Group: ANSC 701, 724; RECO 501 or MKTG 550, RECO 504, RECO 604; DCE 491-492 or CS 401.

Bioscience and Technology Option

BIOL 411-412; PHYS 401-402; MATH 424B; RECO 528; MICR 503 or BIOL 541; ZOOL 507-508 or ZOOL 518 and 627; CHEM 545 or 651-652; BIOL 604; BCHM 658/659 or 751-752; ANSC 750 and three 700-level ANSC courses.

Preveterinary Medicine Option

BIOL 411-412; PHYS 401-402; MATH 424B; RECO 528; MICR 503; ZOOL 507-508; BIOL 604; CHEM 651-652; BCHM 658/659; and one 700-level ANSC course.

For course requirements for the B.S. degree in dairy management, see page 45.

General Science Certification

See page 28.

Biochemistry and Molecular Biology

(For descriptions of courses, see page 108.)

Biochemistry and molecular biology study the chemical basis of life. The program in biochemistry and molecular biology is based on fundamental courses in chemistry and the biological sciences, in addition to preparation in physics and mathematics. The department offers advanced courses in specialized areas of modern biochemistry, molecular biology, cellular metabolism, and biophysics.

Two curricula are offered to meet the educational needs of students with differing professional aspirations.

Biochemistry and Molecular Biology Curriculum A
This curriculum is designed for students planning graduate study in biochemistry, molecular biology, genetics, and biotechnology; and for students seeking admission to professional schools in medicine, dentistry, or pharmacy. It provides in-depth study in chemistry, biochemistry, and molecular genetics along with basic training in the biological and physical sciences. Students entering curriculum A should register for CHEM 405-406, MATH 425-426, and BIOL 411-412 in their freshman year.

Biochemistry and Molecular Biology Curriculum B
This curriculum provides a program leading to skilled technical positions in research laboratories in universities, medical schools, hospitals, government agencies, and industry. This program offers a fundamental education in chemistry, biochemistry, and the biological sciences. Students transferring to the major from the biology program will normally take this curriculum. Flexibility is designed into this curriculum to permit the student to concentrate in a variety of areas fundamental to biochemistry and molecular biology: biomedicine, genetics, biotechnology, and nutrition. Students entering this curriculum should register for CHEM 403-404, MATH 425-426, and BIOL 411-412 in their freshman year.

Students interested in electing a biochemistry major are advised to consult with the department chairperson or a faculty member as early as possible to ensure the most effective curricular planning.

General Science Certification
See page 28.

Biology

(For descriptions of courses, see page 108.)
Students interested in earning a bachelor's degree in a biological science can choose one of the following options within the biology major: (1) ecology and evolutionary biology; (2) general biology; (3) marine and freshwater biology; and (4) molecular, cellular, and developmental biology; or one of the majors in the following departments: (1) animal and nutritional sciences, (2) biochemistry and molecular biology, (3) entomology, (4) microbiology, (5) natural resources, (6) plant biology, or (7) zoology.

A major in one of the biological sciences is appropriate for students planning subsequently to earn M.S. or Ph.D. degrees in a biological science discipline; for those seeking a health-related professional degree; for those desiring teaching certification; and for those desiring employment in a wide variety of biology-oriented industries. Some examples of typical careers for biology majors are environmental consulting, biotechnology, pharmaceuticals, secondary school science education, college teaching and research, health-related professions, and marine biology. Students who wish to choose a departmental major should consult with that department for a more complete list of career opportunities.

Majors in any of the biological sciences must complete the biology core curriculum. New students wishing to major in a specific biological science are encouraged to declare their major in the first year. Those generally interested in the biological sciences but unsure of a specific major at this time should declare general biology to ensure a timely beginning of the core curriculum. In either case, a biology faculty member will be assigned to each student as an academic adviser. The adviser will assist in academic program development, course selection, and choice of major. Changing majors within the biological sciences is easy during the first two years.

Biology Core Curriculum
Students generally take the core courses in the sequence recommended below. Students should discuss selection and sequencing of courses with their adviser because deferral of some courses may be desirable for specific departmental majors, and the courses chosen may vary slightly depending on the major. The biology core curriculum satisfies the four University general education requirements in groups 2 and 3.

Freshman Year
BIOL 400 and 411-412; CHEM 403-404; MATH 424B

Succeeding Years
MICR 503 *or* BIOL 541; RECO 528**; CHEM 545 and BCHM 658/659** *or* CHEM 651-652*; PHYS 401-402**; BIOL 604**; ENGL 501*; EDUC 500†

*For pre–health-related professions only
** Courses that can be deferred to later semesters
† For those preparing for teacher certification only

Biology Major
Students qualify for a B.S. degree in biology when they complete the University general education requirements, the biology core curriculum, and requirements for one of the four options described below. A complete list of approved courses for each option is available from the dean's office, from the Biology Program Office in Taylor Hall, or from a biology adviser.

Biology Major Options
Ecology and Evolutionary Biology. Students must select BIOL 541 or MICR 503 (whichever was not taken as a core requirement). Eight additional courses must be selected from the list of approved courses for this option.

General Biology. Within the biology core, RECO 528 and BCHM 658/659 are preferred. Students must select BIOL 541 or MICR 503 (whichever was not taken as a core requirement). Eight additional courses must be selected from the list of approved courses for this option.

Marine and Freshwater Biology. Students must select BIOL 541 or MICR 503 (whichever was not taken as a core requirement). RECO 528 and BCHM 658 are preferred in the core. It is recommended that students enroll in ZOOL 674, a 6-credit summer experience at the Isles of Shoals Marine Laboratory, in the summer following the freshman year, if possible. A senior project is also strongly recommended. Eight additional courses must be selected from the list of approved courses for this option.

Molecular, Cellular, and Developmental Biology. Students must select BIOL 541 or MICR 503 (whichever was not taken as a core requirement). Eight additional courses must be selected from the list of approved courses for this option.

Departmental Majors

Biology majors may easily change to another biological science major during the first two years, since the core curriculum is common to all biological sciences majors. Departmental major requirements are listed on the following pages: animal sciences, page 42; biochemistry and molecular biology, page 42; entomology, page 45; microbiology, page 47; nutritional sciences, page 48; plant biology, page 48; and zoology, page 52.

Preprofessional Health Program

Students wishing to pursue postgraduate degrees in any of the health-related professions should visit the premed/predental office in Hood House for additional information.

Biology Teacher Certification and General Science Certification

Biology teacher certification for students preparing to teach high school biology can be obtained through the Department of Education's five-year, undergraduate-graduate program. Students are required to take EDUC 500 (preferably in the sophomore year), earn a bachelor's degree in one of the biological sciences, and complete a fifth year, which includes an internship and coursework leading to a master's degree in education. General science certification for students preparing to teach science in middle and junior high schools can be obtained through the Department of Education's general science certification program. For further information, see page 30 or contact the teacher education coordinator in the Department of Education.

Biology Minor

A minor in biology can be earned by completing the following requirements: (1) BIOL 411-412 or PBIO 412 and ZOOL 412; (2) one course from each of the three major organism groups: (a) animals (ANSC, ZOOL, or ENTO courses), (b) microbes (MICR courses), and (c) plants (PBIO courses); (3) two additional biological sciences courses at the 600-700 level.

Students interested in a biology minor should contact the Biology Program Office, Taylor Hall.

Community Development

(For descriptions of courses, see page 117.)

The community development program prepares students for professional careers as local government administrators, town or regional land-use planners, and community facilitators in the public and private sectors of the economy. It is an applied social science degree program that provides the student with an understanding of the interrelated social, economic, political, environmental, and technical factors that contribute to dynamic changes in the community. Attention is focused on the community change process with emphasis on community problem determination, problem analysis, and problem resolution; organizational change; and human development. The curriculum takes an interdisciplinary approach and includes field experience as a vital component, along with classroom and independent study.

Students majoring in community development are encouraged to concentrate in one of three areas: (1) community and institutional change and development, (2) community public administration, and (3) community and regional planning. These areas of specialty provide the necessary background and training to prepare graduates for entry-level positions with local governments and agencies throughout the nation. The community development program also provides a firm base for graduate study in a variety of areas such as regional planning, public administration, rural sociology, economic development, and law.

Minors in community development or community planning provide unique opportunities for students to increase their scope of knowledge and to understand the broader application of their major. The minors complement majors in both technical fields and liberal arts.

Local governments in New England are turning to full-time professional administrators to assume responsibility for the day-to-day administration, management, and planning activities that were previously carried out by part-time town officials. Officials at the New Hampshire Municipal Association estimated that New Hampshire needs at least twenty-five new graduates in community and public administration to fill local government professional needs. In addition to professional administration or planning positions in local or regional government, employment opportunities are also available with public agencies and organizations at the state, national, and international levels.

Students interested in a community development major or a minor in either community development or community planning may consult with the program coordinator or with the chairperson of the Department of Resource Economics and Development.

Required Courses

I. All of the following (16 credits):
CD 415, Community Issues and Perspectives
CD 508, Applied Community Development
RECO 528, Applied Statistics I (or its equivalent)
CD 795, Investigations in Community Development
or CD 793, Community Administration Internship
or CD 794, Community Planning Internship

II. One of the following (4 credits):
RECO 506, Population, Food, and Resource Use in Developing Countries
GEOG 583, Urban Geography
CD 777, Fundamentals and Practice of Community Planning
TOUR 767, Social Impact Assessment

III. At least three courses from the following (12 credits):
RECO 606, Land Use Economics
CD 607, Community Administration and Development
CD 614, Community Planning
CD 627, Community Economics and Finance
CD 710, Community Development Seminar
CD 717, Law of Community Planning

IV. Two courses from two of the following groups (at least 6 credits):
A: SOIL 609 or BIOL 541
B: SOC 642 or 645
C: MGT 580, 712, or 713

V. The following three courses:
MATH 420, Finite Mathematics*
RECO 411, Resource Economics Perspectives*
CMN 500, Public Speaking
or AOE 650, Microcommunications

Community Planning minor requirements (5 courses including):
CD 614, Community Planning
CD 777, Fundamentals and Practice of Community Planning

Group II: Tools and Application in Planning** (2 courses)
Group III: Resource Management Theory** (1 course)

*to satisfy general education requirements
**Contact Professor Jansen, program coordinator, 319 James Hall, for a list of approved courses.

Dairy Management

(For descriptions of courses, see page 101, Animal Sciences.)

The dairy management program, offered by the Department of Animal and Nutritional Sciences, is designed to provide students with solid training in areas important to the successful management of a dairy enterprise. These areas include genetics, nutrition, reproduction, diseases, lactation physiology, forages, agribusiness finance, personnel management, computer science, and public relations. In addition, senior students enrolled in this program will be given complete responsibility for managing the UNH teaching herd, thereby acquiring actual management experience along with their basic subject matter training. The UNH teaching and research center, a modern dairy facility, houses approximately one hundred milking cows plus a similar number of nonlactating animals.

In addition to the University's general education requirements, a typical dairy management student will take the following courses:

First Year
ANSC 408, 508, 552, 554, 603; CHEM 403-404; RECO 411

Second Year
ANSC 612; CS 401; PBIO 421, 432; RECO 504; ZOOL 507-508

Summer Internship

Third Year
ANSC 609, 611, 630, 632, 701, 710, 724; RECO 604

Summer (between third and fourth year)
ANSC 726, 730

Fourth Year
ANSC 727, 728, 731, 732, 741, 742; MGT 580 or 713

Entomology

(For descriptions of courses, see page 133.)

The Department of Entomology offers courses for students who wish to specialize in the study of insects and other terrestrial arthropods, insect pest management, and insects in relation to people. There are employment opportunities for graduates in federal and state agencies, public institutions, and commercial and industrial firms in the areas of crop protection, forestry, conservation, and public health.

Students receive a fundamental education in the major fields of entomology, including general biology of insects and other arthropod groups, forest entomology, economic entomology, medical entomology, insect morphology, taxonomy, and insect pest management. Outstanding students are encouraged to pursue graduate study.

Entomology majors are expected to complete 24 semester credits successfully in courses offered by the department. Courses in other departments may be taken in lieu of the above with the consent of the major adviser. Majors are required to take the following courses: ENTO 402, 503, 705; BIOL 411-412; CHEM 403-404; CHEM 545/546; BCHM 658/659; PHYS 401-402; MATH 424B; RECO 528; BIOL 604; MICR 503; plus four courses from related disciplines approved by their academic adviser.

Students may earn either a bachelor of science or bachelor of arts degree in entomology.

Students may obtain a minor in entomology by completing ENTO 402, 503, 705, and two additional 4-credit courses chosen from departmental courses.

Those contemplating a career in entomology are advised to consult with the chairperson of the Department of Entomology.

General Science Certification

See page 28.

Environmental Conservation

(For descriptions of courses, see page 133.)

The program in environmental conservation gives a broad background for understanding environmental and resource problems and their solutions. Development of policies and planning are essential to resolving environmental problems and require a foundation in biology as well as economics.

Students must choose an option (environmental affairs or environmental science) or develop a concentration that is related to specific career goals (for example, in the areas of environmental education, ecology, journalism, or business). Students choosing the latter route must incorporate a minor into their concentration. In addition to courses in the options or concentrations, students must complete the sixteen core courses listed below.

A minor of five courses in environmental conservation is available for students majoring in other areas. Permission is required.

The following 16 courses are required of all majors:

1. NR 401, Natural Resources Perspectives
2. PBIO 412, Introductory Botany
3. ZOOL 412, Principles of Zoology
4, 5. Ecology electives (two of the following): BIOL 541, General Ecology; FOR 527, Forest Ecology; PBIO 601, Terrestrial Plant Ecology; PBIO 566, Systematic Botany; PBIO/ZOOL 717, General Limnology; PBIO/ZOOL 719, Field Limnology; PBIO 724, Freshwater Algal Ecology; PBIO 745, Plant Community Ecology; PBIO 761, Plant Geography; FOR 706, Terrestrial Arthropods; WARM 721, Ecology of Polluted Waters; WILD 433, Wildlife Ecology; ZOOL/PBIO 503, Introduction to Marine Biology; ZOOL/PBIO 725, Marine Ecology
6. RECO 411, Resource Economics Perspectives
7. Economics elective (one of the following): RECO 676, Economics of Water Use and Quality Management; RECO 606, Land Use Economics; RECO 611, Marine Resource Economics; RECO 708, Environmental Economics; FOR 643, Economics of Forestry; ECON 668, Economic Development
8. CHEM 403, General Chemistry
9. NR 602, Natural Resources Policy
10. WARM 504, Freshwater Resources, *or* SOIL 501, Soils and the Environment
11. EC 637, Practicum in Environmental Conservation (4 credits; this practicum will be an independent project involving fieldwork on an actual conservation activity during the senior year), *or* EC 601, Environmental Conservation Internship
12. EC 710, Environmental History
13, 14. One speaking skills course (AOE 650 or CMN 500 or beyond) and one writing skills course (ENGL 501 or beyond)
15. NR 775, Natural Resources Senior Project
16. Computational skills course (RECO 528, PSYC 402, SOC 502, or equivalent)

Students should plan to work for a master's degree if they wish to be professional conservationists. The undergraduate degree offers an education in environmental conservation with the opportunity for specialization or generalization in related fields.

All students must complete the University general education requirements.

Students interested in a major may consult with the program coordinator, Robert Eckert, James Hall.

General Science Certification

See page 28.

Forestry

(For descriptions of courses, see page 135.)

Forestry is the art and science of managing and understanding the natural and human dimensions of forests and forest use. The forestry program is designed to provide graduating professionals with a sound technical preparation and a broad general education. The forest management and forest science options of the forestry major leading to the bachelor of science in forestry degree (B.S.F.) are accredited by the Society of American Foresters (SAF). The SAF is recognized by the Council on Postsecondary Accreditation and the U.S. Department of Education as the accrediting body for forestry in the United States.

Professional foresters are employed by private industry, public agencies, public interest firms, groups, educational institutions, research organizations, and consulting firms. Some graduates work toward natural resource protection and the improvement of environmental quality. Others are employed in the production and utilization of raw materials; still others become involved with wildlife, watershed, and recreation management and other aspects of ecosystem management. There are rapidly expanding opportunities in international forestry. Many students enter graduate school for advanced training in forest biology or related social sciences.

Technical, administrative, and managerial skills are required of all professional foresters. This program provides a foundation in scientific knowledge, as well as technical and managerial skills, with elective freedom to cultivate special abilities and interests.

Students majoring in forestry must complete 130 credits of classroom work and 4 credits of field training. University general education requirements are included in this total.

Besides these formal courses, all forestry majors are required to have at least one summer of forestry work experience (FOR 500). While students are responsible for their own summer work, placement assistance is available from the faculty.

In addition to the normal University fees and tuition, forestry students pay certain course transportation fees and the cost of meals in connection with some planned field sessions.

In the junior year, students must choose to concentrate in either of the following options (and must earn 24 credits within that concentration to graduate):

Forest Management Option

This option is designed for students who intend to plan a career in forest resource management. Requirements: NR 653, Decision Sciences in Natural Resource Management; FOR 754, Wood Products Manufacture and Marketing; RMP 711, Recreation Resource Management; one course in administration, 500 level or higher; two courses (8 credits) in advanced forestry, wildlife, hydrology, soils, resource management, urban forestry, recreation, or administration.

Forest Science Option

In this option, students may specialize in specific forest sciences as background for graduate school or focus their interests in areas other than forest management. Areas of concentration include genetics, forest ecology, wood science, watershed management, or the social sciences. Students in this option are encouraged to minor in the area of their choice.

Minors

Non-forestry majors may minor in forestry by completing 20 to 22 credits of coursework approved by the forestry program faculty.

Freshman Year	Fall	Spring
FOR 423, Dendrology	2	—
FOR 425, Field Identification of Trees and Shrubs	2	—
NR 401, Natural Resources Perspectives	4	—
ENGL 401, Freshman English	4	—
PBIO 412, Introductory Botany	4	—
FOR 426, Wood Science and Technology	—	4
MATH 424B, Calculus for Life Sciences	—	4
RECO 528, Applied Statistics I	—	4
ENGL 501, Introduction to Prose Writing	—	4
FOR 542, Forestland Measurement and Mapping	—	2
	16	18
Sophomore Year		
FOR 500, Summer Work Experience	0	—
FOR 527, Forest Ecology	4	—
SOIL 501, Soils and the Environment *or* SOIL 502, Soil-Plant Relationships	—	4
CHEM 403, General Chemistry	4	—
WILD 433, Wildlife Ecology	4	—
RECO 411, Resource Economics Perspectives *or* ECON 402, Principles of Economics (Micro)	4	—
FOR 544, Forest Biometrics	—	3
ENTO 506, Forest Entomology	—	4
General Education Elective 4, 5, 6, 7, or 8	—	4
General Education Elective 4, 5, 6, 7, or 8	—	4
	16	19
Junior Year		
FOR 629, Silviculture	3	—
FOR 643, Economics of Forestry	4	—
PBIO 653, Forest and Shade Tree Pathology	4	—
Professional Option	4	—
FOR 660, Forest Fire Protection	—	2
General Education Elective 4, 5, 6, 7, or 8	—	4
General Education Elective 4, 5, 6, 7, or 8	—	4
Professional Option	—	4
FOR 652, Forest Resources Assessment	—	2
	15	16
Senior Year		
FOR 745, Forest Management	4	—
WARM 603, Watershed Water Quality Management	4	—
NR 775, Natural Resources Senior Project	2	—
NR 757, Photo Interpretation and Photogrammetry	4	—
Professional Option	4	—
NR 602, Natural Resources Policy	—	4
Professional Option	—	4
Professional Option	—	4

General Education Elective 4, 5, 6, 7, or 8	—	4
	18	16

Students interested in the forestry program may consult with the program coordinator, Theodore Howard, James Hall.

General Science Certification
See page 28.

General Studies

General studies is a flexible curriculum for students with a broad, general interest in several areas of life sciences and agriculture. It cuts across departmental lines and in some respects resembles a self-designed major. It is not intended to be a catch-all for students from other colleges but is designed to serve the needs of life sciences and agriculture students. Requirements for a general studies major are CHEM 403-404, BIOL 411-412 (or PBIO 412 and ZOOL 412), and six additional courses in the college (or closely related courses approved by the adviser), two of which must be at the 600 level or above. These courses should be interrelated in such a way that they will help students meet their goals for employment or further study.

Freshmen who are unsure of a major should not declare general studies as a major but should remain undeclared for a semester or two (see page 40). The program is generally not available to students entering their senior year.

Microbiology

(For descriptions of courses, see page 156.)

Microbiology explores the world of organisms too small to be seen with the unaided eye. The primary emphasis in the Department of Microbiology is on prokaryotes (bacteria and archaea) and viruses. The curriculum provides basic familiarity with microorganisms, their interactions with other life forms (including humans), and their roles in natural systems and processes.

Baccalaureate degree holders in microbiology secure positions in industry (food and beverage, pharmaceutical, bioproducts, etc.); in city, state, and federal agencies (public health, environmental quality, regulatory, etc.); or in universities or research institutes.

The Department of Microbiology offers programs of study leading to the bachelor of science degree. Microbiology is widely recognized as being both a basic life science and a highly pragmatic applied science. Two curricula within the microbiology program are intended to accommodate the diverse needs of potential students. *Curriculum A* is recommended for individuals intending to enter the work force or pursue graduate education in the biological sciences, biomedicine, or biotechnology. It also provides for entry into professional programs such as dentistry, human medicine, or, with little additional preparation, veterinary medicine. *Curriculum B* is appropriate for students planning to enter the work force immediately upon graduation, as research technicians, applied scientists, or in sales or marketing positions in the life sciences or biotechnological enterprises. This curriculum would be appropriate for transfer students from other colleges or universities as well as for students planning to pursue a degree in business, including the M.B.A., as appropriate for careers in managing diagnostic laboratories or in hospital administration.

Each curriculum is satisfied by Microbiology Group One and Group Two course requirements. Group One courses are common to all students in that curriculum. Group Two requirements are satisfied by choosing at least one microbiology course from each of four categories: medical, general, ecological, and applied. Students are required to complete seven microbiology courses totaling a minimum of 28 credits for a major in microbiology.

Curriculum A

Curriculum A has the following Group One requirements: MICR 503, 602, 704, 705; MATH 424B or 425; CHEM 403-404, 651-652 (and corequisite 653-654); BCHM 751-752; BIOL 411-412, 604; RECO 528 (or equivalent); PHYS 401-402. Group Two requirements may be satisfied by choosing at least one course from each of the following areas: medical (MICR 702, 706); general (MICR 709, 710, 716); ecological (MICR 707, 713; PBIO 721); and applied (MICR 600, 714, 751).

Curriculum B

Students entering this program as freshmen will be advised to adhere closely to the biology core curriculum. However, students may also transfer into the microbiology program from liberal arts, health sciences, or other science programs via this curriculum. Curriculum B has the following Group One requirements: MICR 503; MATH 424B or 425, or RECO 528 (or equivalent); BCHM 658/659; CHEM 403-404 and CHEM 545/546 or CHEM 651-652 (and corequisite 653-654); BIOL 411-412, or two semesters of a laboratory biological science may be accepted upon approval. Group Two requirements may be satisfied by choosing at least one course from each of the following areas: medical (MICR 602, 702, 705, 706); general (MICR 704, 709, 710, 716); ecological (MICR 707, 713; PBIO 721); and applied (MICR 600, 714, 751). Other microbiology-related courses offered in the following departments may be taken with an adviser's permission: animal sciences, biochemistry and molecular biology, plant biology, civil engineering, zoology, or medical laboratory science. Courses in these areas are reviewed periodically by the microbiology faculty to ascertain their suitability for microbiology majors.

Problems in Microbiology (MICR 795, 796) is available by special permission and allows students the opportunity to conduct semi-independent research projects in conjunction with departmental faculty. Up to 4 credits of Problems in Microbiology may be applied to major requirements, although students may enroll for additional hours. Students must receive a minimum grade of C– in each course meeting major requirements and 2.00 overall average in their major requirements.

Students planning to attend graduate or postgraduate professional school or to apply for certification as registered microbiologists through the American Society of Microbiology are strongly advised to take a course in quantitative analysis (CHEM 517-518).

Individuals considering a major in microbiology are strongly encouraged to enroll in MICR 503 and organic chemistry in their sophomore year. Requirements in the biology core curriculum may be deferred until the subsequent year, if necessary.

Students may obtain a minor in microbiology by successfully completing MICR 503 and four additional departmental courses totaling a minimum of 20 credits at the 600 or 700 level. BCHM 658/659 may be substituted for one of these courses. A maximum of 4 credits of Problems in Microbiology may be applied to the minor.

Departmental Honors

Honors in microbiology will be awarded to students who complete 16 credits of honors courses in microbiology (including a minimum of 4 credits in a senior research project), and who maintain a minimum grade-point average of 3.20 in the major. Students interested in the microbiology honors program should apply to the department before their junior year.

Students wishing to declare a major or minor in microbiology or to be admitted to the microbiology honors program should consult Richard P. Blakemore.

Nutritional Sciences

(For descriptions of courses, see page 161 and page 101, Animal Sciences.)

The science of nutrition is the study of nutrients in food and the body's handling of these nutrients. As an applied science, nutrition is based on biochemistry and physiology but can also include anthropology, economics, genetics, microbiology, pathology, animal sciences, and zoology. Consequently, the nutritionist often cooperates with workers in many different fields. The nutrition program at UNH is designed to permit specialized study in human and/or animal nutrition.

Two curricula are offered to meet the educational needs of students with differing professional aspirations.

Basic Science Curriculum provides students with a solid science background in biology, chemistry, physiology, nutrition, biochemistry, and physics. Upon graduation, students are well prepared for technically oriented jobs in science. This curriculum is also excellent preparation for students planning further education in graduate school or professional schools of medicine and dentistry. Students in this curriculum are required to complete the biology core curriculum: NUTR 400, NUTR 499, NUTR 750, ZOOL 507 and 508, MICR 503, BCHM 658/659, ENGL 501, and 12 additional credits from recommended courses in nutrition.

Dietetics Curriculum is approved by the American Dietetics Association (ADA) and prepares students to apply for a post-graduate dietetic internship. Completing this internship and passing the ADA examination are essential for becoming a registered dietitian (RD), requisite for employment opportunities in clinical dietetics and community nutrition. Required courses for this curriculum are NUTR 400, 401, 405, 476, 478, 499, 503, 504, 509, 511, 550, 620, 650, 750, 773, 775, and 780; ZOOL 507 and 508; CHEM 403-404, and 545-546; ENGL 401; DCE 491; MICR 501 or 503; BCHM 658/659; SOC 500; MGT 614; EDUC 701C; HMP 710; and either PSYC 402, SOC 502, RECO 528, or HHS 540.

Plant Biology

(For descriptions of courses, see page 171.)

Plant biology is the study of plants at the population, organismal, cellular, and molecular level; and the investigation of the uses of plants for food, fiber, recreational, and ornamental purposes. Offerings in marine and freshwater plant biology are provided and are facilitated by the Jackson Estuarine Laboratory and two marine laboratories where the plant biology faculty maintains an active involvement in teaching and research. The Department of Plant Biology offers three baccalaureate degrees: bachelor of science in plant biology, bachelor of science in horticulture and agronomy, and bachelor of arts in plant biology. See also programs listed under biology major, page 43, and marine sciences, page 83.

B.S. in Plant Biology

This degree is highly suitable for students intending to enter the field of secondary education; to seek employment with agricultural, pharmaceutical, and biotechnology industries; governmental agencies, environmental groups, and consulting firms; or to undertake graduate studies. Students interested in university teaching and/or research, and governmental and industrial research, should plan to complete graduate education in the field.

Students entering the B.S. in plant biology program are required to complete the biology core curriculum and to take PBIO 401, 606, 608, 774, and choose one of the following: PBIO 566, 666, or 703. Six additional courses must be selected from those listed below under categories 1–5, with the proviso that no more than four courses from one category can be used to fulfill the requirement. It is strongly recommended that students choose courses from as many of the categories as possible to obtain a broad background in plant biology.

Category 1: Systematics, Ecology, and Evolution PBIO 535, 566, 601, 625, 666, 703, 705, 717, 719, 721, 722, 724, 742, 745, 747, 758, 761.

Category 2: Marine and Freshwater Plant Biology PBIO 503, 625, 717, 719, 721, 722, 724, 725, 747.

Category 3: Plant Structure and Physiology PBIO 709, 713, 714/715, 727/729, 751, 758, 764, 765, 774/775, 776.

Category 4: Ornamental and Crop Science PBIO 535, 565, 651, 652, 653, 655, 672, 678, 682, 689, 706/708; ENTO 402, 503, 506, 726; SOIL 501, 502.

Category 5: Plant Genetics and Biotechnology PBIO 705, 714/715, 753, 764, 765, 773, 774/775, 776; BCHM 771, 772.

B.S. in Horticulture and Agronomy

This program offers a flexible curriculum for students interested in managing farms, greenhouses, golf courses, and nurseries; in teaching; in practicing journalism; in working for park and highway planning commissions; in working in sales or brokerage aspects of wholesale and retail marketing; and in finding employment in food- and feed-processing firms.

Students are required to take the core courses and support courses listed below. In addition, students must select an area of specialization.

Core Courses	Credits
PBIO 401, Plant Biology Orientation	1
PBIO 412, Introductory Botany	4
PBIO 421, Concepts of Plant Growth	4
PBIO 606, Plant Physiology	3
PBIO 612, Genetics of Domesticated Plants	4
PBIO 651, Plant Pathology *or*	4
PBIO 653, Forest and Shade Tree Pathology	4
PBIO 672, Plant Propagation	4
PBIO 706/708, Biology of Weeds	4
PBIO 797, Senior Seminar	1

Crop Science Specialization

PBIO 682, Sustainable Food Systems	4
ENTO 726, Integrated Pest Management	4
A minimum of 8 credits of production courses:	
PBIO 432, Animal Forages	3
PBIO 445, Nursery Culture and Operation	3
PBIO 458, Bedding Plant Production	2
PBIO 463, Floricultural Crop Production	3
PBIO 565, Turf Management	4
PBIO 652, Vegetable Crops	4
PBIO 655, Fruit Crops	4

PBIO 678, Ornamental Plants	4
PBIO 689, Herbaceous Landscape Plants	4

Ornamentals Specialization

PBIO 427, Landscaping the Home Ground	4
PBIO 565, Turf Management	4
PBIO 566, Systematic Botany	4
PBIO 678, Ornamental Plants	4

A minimum of 6 credits from the following:

PBIO 445, Nursery Culture and Operation	3
PBIO 454, Landscape Construction and Maintenance	3
PBIO 458, Bedding Plant Production	2
PBIO 461, Interior Plants and Plantscaping	3
PBIO 463, Floricultural Crop Production	3
PBIO 464, Horticultural Pruning	2
PBIO 689, Herbaceous Landscape Plants	4

Support Courses

CHEM 403-404, General Chemistry	8
CHEM 545/546, Organic Chemistry	5
SOIL 502, Soil-Plant Relationships	4
ENTO 402, Introductory Entomology	4
or 503, Principles of Applied Entomology	4
RECO 411, Resource Economics Perspectives	4

Five-Year Dual Degree Program

A five-year dual degree program leading to a B.S. in horticulture and agronomy and an M.B.A. degree (business administration) is available. Students preparing for a business career in agricultural enterprises should notify the department of their interest in their sophomore year. Superior students will be considered for Graduate School enrollment in their junior year.

B.A. in Plant Biology

Students must complete a minimum of 37 semester credits in the major. The curriculum provides a broad background in the liberal arts and plant biology. Students may enter this program as freshmen or transfer into it from other liberal arts or science programs. This program is of particular interest to students who intend to utilize their plant biology training in public relations, teaching, or other related careers in combination with a liberal arts background. The program allows for obtaining minors in other fields such as journalism, history and philosophy of science, international affairs, education, art, and the like, to create an interdisciplinary program, or to pursue a double major.

Requirements	Credits
PBIO 401, Plant Biology Orientation	1
PBIO 412, Introductory Botany (or BIOL 411-412, Principles of Biology I & II)	4
BIOL 541, General Ecology (or PBIO 601, Terrestrial Plant Ecology)	4
PBIO 566, Systematic Botany (or PBIO 666, Summer Flora of N.H.)	4
BIOL 604, Principles of Genetics (or PBIO 612, Genetics of Domesticated Plants)	4
PBIO 606/608, Plant Physiology	5
PBIO 774, Plant Cell Culture & Genetic Engineering	3

Plant Biology Electives:

12 credits minimum

Highly recommended: Select upper-level electives from several of the five plant biology categories (see B.S. program).

General Education

Required: Group 3, CHEM 403-404, General Chemistry

Recommended: Group 2, RECO 528, Applied Statistics I

Group 8, PHIL 424, Science, Technology, & Society; and HUMA 651, Humanities and Science: The Nature of Scientific Creativity

Foreign Language

See University requirement, page 14.

General Science Certification

See page 28.

Minors

The Department of Plant Biology participates in the interdisciplinary minor in plant pest management and offers two departmental minors: minor in plant biology and minor in horticulture and agronomy. These minors are available to all students and are designed to provide a flexible and broad selection of courses to complement any other major area of study.

The specific requirements of the minor in plant biology include PBIO 401, PBIO 412 or equivalent, and a minimum of 15 credits from the following list of courses: PBIO 503, 566, 601, 606/608, 625, 651, 653, 666, 703, 705, 709, 713, 714/715, 717, 719, 721, 722, 724, 727, 729, 740, 745, 747, 751, 753, 758, 761, 764, 767, 774/775, 776, 795, 799.

The requirements for the horticulture and agronomy minor are PBIO 401, PBIO 421, and a minimum of 15 credits from the following list of courses: PBIO 427, 445, 454, 463, 565, 566, 606/608, 612, 651, 652, 653, 655, 672, 678, 682, 689, 706/708.

For selection of specific courses, see the department chair or your adviser.

Resource Economics

(For descriptions of courses, see page 179.)

This program offers training in resource economics, including public resource policy, resource management, natural resource and environmental economics, and community economics and finance. This program emphasizes applied economics in the context of public policy. Training is also available in agricultural economics, including agribusiness, small business management, food marketing, agricultural policy, and world food supplies.

Students majoring in resource economics will normally concentrate in one of the following three areas: natural resource economics, agricultural economics, or community economics. In addition, students must satisfy general education requirements, which lead to a broad university education. Majors interested in the economic or business aspects of agriculture and natural resources will be expected to take courses in the biology departments.

Students majoring in any of the social science, life science, and agriculture departments of the University may find it to their advantage to elect courses or a minor in resource economics or agribusiness. By doing so, their basic training can be supplemented in a specific area of interest, such as resource development and natural resource policy for social science majors, farm management and agricultural marketing for agricultural majors, and community economics and finance for students interested in local government and development.

Required Courses

All of the following:

ECON 401, Principles of Economics (Macro)

RECO 411, Resource Economics Perspectives
RECO 504, Business Management for Natural Resource Firms
MATH 420, Finite Mathematics, *or* MATH 424B, Calculus for Life Sciences
ECON 605, Intermediate Microeconomic Analysis
ECON 611, Intermediate Macroeconomic Analysis, *or* ECON 635, Money & Banking
RECO 528, Applied Statistics I, *or* DS 420, Business Statistics

At least five of the following, of which two must be 700 level:
RECO 501, Agricultural and Natural Resource Product Marketing
RECO 506, Population, Food, and Resource Use in Developing Countries
RECO 604, Financial Concepts for Natural Resource Firms
RECO 606, Land Use Economics
RECO 611, Marine Resource Economics
RECO 627, Community Economics and Finance
RECO 633, Economics of Travel and Tourism
RECO 666, Empirical Resource Economics: Methods and Techniques
RECO 676, Economics of Water Use and Quality Management
RECO 704, Economics of Policy Issues in Food and Natural Resource Use
RECO 708, Environmental Economics
RECO 710, Resource Economics Seminar
RECO 715, Linear Programming and Quantitative Models
RECO 756, Rural and Regional Development

Students who major in resource economics are qualified for a wide variety of opportunities upon graduation. Private business, public institutions, and government agencies currently have a strong demand for specialists trained in natural resource development; land and water use policy; natural resource and small business management; agricultural, fisheries, and forestry marketing; and community development. In many cases, students may wish to improve their qualifications by pursuing more specialized graduate studies in one or more of the above areas.

Departmental Honors

Honors in resource economics will be awarded to students who complete 16 credits of honors courses in resource economics (including a minimum of 4 credits of a senior research project), and who maintain a minimum grade-point average of 3.20 in the major. Students interested in the resource economics honors program should contact the resource economics and development chairperson in James Hall for more information.

Students interested in a major or minor in resource economics or agribusiness may consult with the department chairperson.

Soil Science

(For descriptions of courses, see page 184.)

Soil scientists are concerned with proper management of our soil resources, both in rural and urban environments, and with the essential role of soil in food and fiber production. Growing national attention to environmental concerns has also created a need for soil scientists as members of interdisciplinary teams engaged in a variety of natural resource issues.

Career opportunities are excellent for graduates of the soil science program. There is a growing awareness that planning, design, and construction of public and private facilities must be compatible with the soil upon which these facilities are placed. Thus, the increasing urbanization of the Northeast has created a demand for soil scientists competent to advise on soil considerations during planning and development stages. Soils expertise is usually needed in identification of sensitive areas in need of protection. Soil scientists often play important roles in toxic waste remediation, aquifer protection, and site selection for hazardous waste disposal or storage. There is also a growing role for soil scientists who wish to work with plant scientists and foresters in improving food and fiber production.

Students in the soil science program are given a strong analytical background for studying physical, chemical, and biological properties of soils, as well as their classification and management. Graduates are well prepared for further study in graduate school, and professional certification is available through the American Registry of Certified Professionals in Soils.

Core Courses

A. Soil Science Courses
SOIL 501, Soils and the Environment
SOIL 502, Soil-Plant Relationships
SOIL 609, Soils and Community Planning
SOIL 702 and 703, Chemistry of Soils and Chemical Analysis of Soil
SOIL 704, Soil Genesis and Classification
SOIL 706, Soil Mapping

B. Natural Resources Courses
NR 401, Natural Resources Perspectives
FOR 527, Forest Ecology
NR 602, Natural Resources Policy
NR 775, Natural Resources Senior Project

C. Support Courses
ESCI 401, Principles of Geology I
PBIO 412, Introductory Botany
CHEM 403-404, General Chemistry
PHYS 401 (or 407), Introduction to Physics I
RECO 411, Resource Economics Perspectives
RECO 528, Applied Statistics I
One course in mathematics (MATH 420, 424B, or 425)
One course in organic chemistry or geochemistry (CHEM 545/546, ESCI 741, or equivalent)
One writing course beyond ENGL 401 (ENGL 501, DCE 596, or equivalent)
One oral communications course (not a seminar) (CMN 500, AOE 650, or equivalent)

Students interested in the soil science major should consult with Robert Harter.

General Science Certification

See page 28.

Tourism

(For descriptions of courses, see page 188.)

Planning for tourism development is a process whose time has come. The tourism curriculum provides students with the skills and knowledge necessary to plan, develop, and manage the natural, cultural, financial, and human resources of tourism regions in an environmentally responsible manner. This program, offered by the Department of Resource Economics and Development, utilizes an interdisciplinary approach to provide students with a strong liberal education supplemented by a broad professional understanding of tourism and its role in local, state, national, and global economic and social development.

The B.S. degree program in tourism takes into account the dynamics of the technological, cultural, economic, and political aspects of tourism in relation to its vital components and functions. Students study both the social and environmental sciences to plan for and manage the use of natural and cultural resources. The program also emphasizes communication and business skills because of their fundamental importance to tourism operations and systems.

Required Courses

All of the following:
TOUR 400, Introduction to Tourism
RECO 411, Resource Economics Perspectives
DCE 491, Introduction to Computer Information Studies I
RECO 504, Business Management for Natural Resource Firms
MKTG 550, Survey of Marketing
SOC 601, Methods of Social Research
NR 602, Natural Resources Policy
CD 614, Community Planning
TOUR 615, Tourism Planning and Development
TOUR 633, Economics of Travel and Tourism
TOUR 700, Marketing Tourism Services
TOUR 767, Social Impact Assessment
TOUR 794, Tourism Internship

At least three of the following:
CMN 402, Communication and Social Order
TOUR 440, Tourism Attractions and Activities
TOUR 460, Professional Values and Ethics
TOUR 500, Trend Analysis and Policy Development
CD 508, Applied Community Development
TOUR 550, Tourist Characteristics and Behavior
CD 627, Community Economics and Finance
TOUR 640, Travel and Tourism Transportation Systems
TOUR 660, Designing and Implementing Conferences and Meetings
CD 717, Law of Community Planning
TOUR 720, Domestic and International Destinations
TOUR 792, International Experience
TOUR 798, Independent Study in Tourism

The tourism program is designed for students who wish to obtain positions leading to professional roles in planning, development, and management in either the public or private sectors of the tourism industry. The travel and tourism industry is one of the fastest growing segments of the economy. This rapid growth has created a need for professionals educated in tourism. The program provides superior and exciting opportunities for students to prepare for these challenging new positions. Class projects and the required internship enable students to meet and work in association with representatives from the public and private sectors of the tourism industry. The undergraduate program also provides capable students with a solid foundation for advanced studies.

Water Resources Management

(For descriptions of courses, see page 188.)

There is a critical need for individuals who understand how changes in land use affect water quantity and quality. The B.S. degree program in water resources management is designed to educate students in the principles of land management, biology, chemistry, water quality, and hydrology specifically as they relate to the management of water resources. The program stresses an interdisciplinary approach to resource management, including environmental, economic, social, and political considerations. Hands-on field experience is expected and research projects are encouraged.

This degree program is designed for students who intend to pursue advanced degree work in environmental studies or careers in government, in public or private utilities that manage land and water resources, in private consulting firms that offer water resource management services, and in any of a wide variety of not-for-profit organizations that address land and water resource issues.

The program is divided into three interacting parts: general education, core requirements, and an area of specialization or exploration. The core program provides a foundation in both physical and social sciences. The area of specialization or exploration allows students to pursue a minor or double major, or to survey a variety of courses relevant to water resources management. This allows students to tailor their education to meet individual areas of interest.

In addition to formal courses, all water resources management majors are required to participate in a relevant work experience or internship (WARM 500) and a senior project (NR 775). Students are responsible for identifying appropriate work experiences, although assistance is available from the faculty. Students may also choose to do a senior thesis (WARM 795).

Water resources management students will be required to pay occasional special fees in addition to normal tuition and University fees. The special fees will defray the costs of travel, lodging, and meals for some field sessions as well as copying expenses as needed.

Students who are interested in the water resources management B.S. program should contact William B. Bowden or William H. McDowell in the Department of Natural Resources.

General Education	Credits
ENGL 401, writing skills	4
MATH 424B*, quantitative reasoning	4
BIOL 411*, science	4
CHEM 403-404*	8
Elective, historical perspectives	4
Elective, foreign culture	4
Elective, fine arts	4
RECO 411, social science elective	4
Works of literature, philosophy, and ideas	4
	40

Core Water Resources Management Degree Requirements

One additional course in writing or public speaking	4
RECO 528, Applied Statistics I	4
PHYS 401, Intro Physics I *or* PHYS 407, General Physics I	4
PHYS 402, Intro Physics II *or* PHYS 408, General Physics II	4
BIOL 412*, Principles of Biology II	4
BIOL 541, General Ecology	4
Various, computer expertise	4
CD 614, Community Planning	4
One course in geology	4
ESCI 705, Principles of Hydrology	4
RECO 676, Economics of Water Use and Quality Management	4
SOIL 501, Soils and the Environment	4
WARM 500, Summer Work Experience	0
WARM 504, Freshwater Resources	4
WARM 603, Watershed Water Quality Management	4
WARM 700, Issues in Water Resource Management	2
WARM 721, Ecology of Polluted Waters	4
NR 401, Natural Resources Perspectives	4
NR 602, Natural Resources Policy	4
NR 775, Natural Resources Senior Project	4
	74

* Alternates available.

A total of 20 additional credits must be taken from a combination of courses devised by the student and his or her adviser that suitably defines a coherent area of professional specialization.

Wildlife Management

(For descriptions of courses, see page 189.)

The wildlife curriculum is for students interested in the ecology, conservation, and management of wild animals. It is designed to provide a knowledge of wildlife species and of the total forest

and field environment of which they are a part. It prepares the student for work with public and private agencies in wildlife management and is a base for graduate study as needed for research and teaching.

Fieldwork is carried out during the academic year on wildlife areas near the campus. In June each year a two-week field session is held for all students who have completed the sophomore year. Majors are assisted and encouraged to obtain summer employment related to their career objectives.

The degree earned is a bachelor of science with a major in wildlife management. The program is administered in the Department of Natural Resources.

In addition to the normal University fees and tuition, wildlife students are required to meet special fee charges in connection with regularly planned field sessions.

Freshman Year	Fall	Spring
WILD 433, Wildlife Ecology	4	—
NR 401, Natural Resources Perspectives	4	—
BIOL 411, Principles of Biology I	4	—
or PBIO 412, Introductory Botany	4	—
FOR 423, Dendrology	2	—
FOR 425, Field Identification of Trees and Shrubs	2	—
BIOL 412, Principles of Biology II	—	4
or ZOOL 412, Principles of Zoology	—	4
ENGL 401, Freshman English	—	4
MATH 420, Finite Mathematics *or* MATH 424B, Calculus for Life Sciences	—	4
Elective (a physical science is recommended)*	—	4
Sophomore Year		
WILD 515, Wildlife Habitat Management	3	—
ZOOL 507, Human Anatomy and Physiology	4	—
ENGL 501, Introduction to Prose Writing	4	—
or DCE 596, Technical Writing	4	—
CS 401, Computer Applications	4	—
or DCE 491 Introduction to Computer Information Studies I	2	—
Elective*	4	—
RECO 528, Applied Statistics I	—	4
ZOOL 542, Ornithology	—	4
ZOOL 508, Human Anatomy and Physiology	—	4
Elective*	—	4
FOR 542, Forestland Measurement and Mapping	—	2
Junior Year		
ZOOL 712, Mammalogy	4	—
or ZOOL 713, Animal Behavior		
BIOL 541, General Ecology	4	—
RECO 411, Resource Economics Perspectives	—	4
WILD 609, Seminar	Au	—
Elective*	4	—
NR 602, Natural Resources Policy	—	4
WILD 636, Wildlife Biology and Field Techniques	—	4
WILD 610, Seminar	—	Au
WILD 695, Investigations: Waterfowl Management	—	4
Elective*	—	4
Senior Year		
FOR 629, Silviculture	4	—
WILD 737, Wildlife Population Dynamics	4	—
WILD 609, Seminar	2	—
NR 775, Natural Resources Senior Project	—	2
Elective*	4	—
WILD 738, Wildlife Policy and Management	—	4
WILD 610, Seminar	—	2
Elective	—	4
Elective	—	4
Elective	—	4

*Electives should be used to satisfy remaining general education requirements and the wildlife major requirements in the areas of policy and administration, communication skills, and physical sciences (one course in each area—pertinent courses are listed in the detailed wildlife curricula guidelines available from the department).

Students interested in the wildlife management major may consult with the program coordinator, David Olson, Pettee Hall.

General Science Certification
See page 28.

Zoology

(For descriptions of courses, see page 190.)

The Department of Zoology has a primary responsibility for undergraduate and graduate instruction in fundamental aspects of animal biology, including the principles of form, function, development, and diversity produced by animal evolution. The teaching program provides a broad coverage of basic biological processes in invertebrate and vertebrate animals at the cellular, organismic, population, and community levels. Students receive background for a variety of professional positions in the public and private sector, and for graduate programs in the biological sciences including health-related fields. The department offers the bachelor of arts, bachelor of science, master of science, and doctor of philosophy degrees. Zoology faculty contribute significantly to the biology core curriculum, marine biology minor, genetics program, University Honors Program, Ocean Projects and Undergraduate Research Opportunity programs, and courses at the Shoals Marine Laboratory.

There is a strong teaching and research emphasis on ecological and physiological processes in aquatic animals or ecosystems. This focus is enhanced by the geographical location of the University and the availability of facilities for aquatic research. The University provides unusual opportunities for the study of a wide variety of aquatic and terrestrial animals due to its access to the seacoast and the lakes region of New Hampshire, and the presence of two coastal marine laboratories, as well as estuarine and freshwater laboratories.

The zoology major builds from the common background of the biology core curriculum, with ample time for third- and fourth-year students to concentrate in specialized disciplines such as marine and freshwater biology, behavior, cell and developmental biology, ecology, evolution, fisheries, physiology, and neurobiology. Zoology majors must complete 32 credits from courses in the biological sciences approved by the department with a 2.00 average and at least a C– in each course. Minimum requirements for the zoology major are as follows: completion of the biology core (which includes chemistry, math, statistics, physics, and biology courses) and ZOOL 518 or 628; ZOOL 627; ZOOL 629 or BIOL 605; and biological science electives.

Students who are interested in a zoology major should consult the department's undergraduate adviser.

General Science Certification
See page 28.

College of Engineering and Physical Sciences

Otis J. Sproul, Dean
Donald W. Melvin, Associate Dean

Department of Chemical Engineering
Department of Chemistry
Department of Civil Engineering
Department of Computer Science
Department of Earth Sciences
Department of Electrical Engineering
Department of Mathematics
Department of Mechanical Engineering
Department of Physics
Engineering Technology Program

Bachelor of Science
Chemical Engineering*
  Energy
  Environmental Engineering
Chemistry*
  Environmental Chemistry
Civil Engineering*
Computer Science*
Electrical Engineering*
  Computer Engineering
  Electrical Engineering Systems
  Student-Designed Option
Electrical Engineering Technology*
Geology*
Hydrology* (Interdisciplinary)
Mathematics*
Mathematics Education*
  Elementary
  Middle/Junior High
  Secondary
Mathematics (Interdisciplinary)
  Mathematics—Chemistry
  Mathematics—Computer Science
  Mathematics—Economics
  Mathematics—Electrical Science
  Mathematics—Fluid Dynamics
  Mathematics—Mechanics
  Mathematics—Physics
  Mathematics—Statistics
  Mathematics—Thermodynamics
Mechanical Engineering*
  Energy
Mechanical Engineering Technology*
Physics*

Bachelor of Arts
Chemistry
  Environmental Chemistry
Chemistry and Physics Teaching
Earth Science Teaching
Earth Sciences
Mathematics
Physics

*Designated degree (the name of the specialization is on the diploma; e.g., B.S. in Chemistry).

The College of Engineering and Physical Sciences provides an optimal opportunity for students to achieve educational objectives appropriate to their interests in engineering, mathematics, and the physical sciences. The college offers a vigorous professional education in each of its ten primary disciplines leading to the bachelor of science and a broad liberal education coupled with majors in mathematics and each of the three physical sciences leading to the bachelor of arts. All programs include an opportunity for study in the arts, humanities, and social sciences.

The key to an undergraduate program in the college is flexibility, with a strong emphasis on personal and individualized education. In addition to specific programs, a number of options are available. Special programs can be developed to meet the specific interests of individual students.

MATH 425 and 426 (Calculus I and II) or the equivalent in transfer credits or advanced placement approved by the Department of Mathematics are required by all departments of the college for their majors. Prerequisites for calculus are three years of college-preparatory mathematics, including a half-year of trigonometry.

Accreditation

The baccalaureate-level programs in chemical, civil, electrical, and mechanical engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. The baccalaureate-level programs in electrical and mechanical engineering technology are accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology. The baccalaureate-level program in computer science is accredited by the Computer Science Accreditation Commission of the Computing Sciences Accreditation Board. The Department of Chemistry's undergraduate bachelor of science program is approved by the American Chemical Society.

Degree Requirements

Candidates for a degree must satisfy all of the University general education requirements for graduation, as well as the particular requirements of their individual major programs. In addition, students in the four engineering programs must elect, as part of their general education courses, one of the following two-course sequences, for instance, HIST 436 and FREN 525. (This will ensure that these students have selected courses that provide both breadth and depth in their studies of the humanities and social sciences. This is a requirement established by the Accreditation Board for Engineering and Technology):

ANTH 411-ANTH 625
ANTH 411-ANTH 518
FREN 525-FREN 621
HIST 421-RUSS 425
GEOG 401-GEOG 581
GEOG 401-GEOG 582
GEOG 402-GEOG 581
GEOG 402-GEOG 582
PHIL 401-PHIL 421
POLT 403-POLT 560
RUSS 425-RUSS 593
RUSS 425-RUSS 521
HUMA 401-HUMA 510C, 511C, 512C, 513C
HUMA 401-HUMA 510A, 511A, 512A, 513A
HUMA 401-HUMA 510D, 511D, 512D, 513D
HIST 435-ARTS 570
HIST 435-ARTS 571
HIST 436-FREN 525
HIST 436-GERM 525
HIST 436-SPAN 525
HIST 421-HIST 425

Degrees

Bachelor of Science

The programs leading to the bachelor of science degree, offered in each of the

departments of the college, emphasize the preparation of students for a professional career and continuing or graduate education.

The degree requirements for the bachelor of science include the University general education requirements (page 14) and the specific departmental requirements for graduation. A minimum grade-point average of 2.00 must be achieved. Graduation credit requirements established by the departments range from 128 to 133. There are enrollment limitations in some programs, and it is not possible to guarantee all change-of-major requests.

Bachelor of Arts

Programs leading to a bachelor of arts degree are offered in the departments of chemistry, earth sciences, mathematics, and physics. These programs provide a broad liberal education along with a major in one of these fields. The University requirements for the bachelor of arts degree are on page 16.

Interdisciplinary Majors

Bachelor of Science in Hydrology

The hydrology major is an interdisciplinary major offered by the departments of earth sciences and civil engineering. The coordinator of the program is S. Lawrence Dingman of the Department of Earth Sciences. For details of this program, please see B.S. in hydrology under earth sciences (page 59).

Bachelor of Science in Mathematics

Mathematics–Chemistry option
Mathematics–Computer Science option
Mathematics–Economics option
Mathematics–Electrical Science option
Mathematics–Fluid Dynamics option
Mathematics–Mechanics option
Mathematics–Physics option
Mathematics–Statistics option
Mathematics–Thermodynamics option

For details of these programs, please see page 62 under mathematics.

Interdisciplinary Minors

Interdisciplinary minors have been developed in environmental engineering, hydrology, illumination and optical engineering, materials science, ocean engineering, and oceanography. These programs enable students to obtain experience in the specialized area and to retain identification with their major professional area. (For University requirements, see page 17.)

Environmental Engineering

The environmental engineering minor is intended primarily for students in engineering and physical sciences, other than civil and chemical engineering majors. Students contemplating such a minor should plan on a strong background in the sciences and mathematics (including differential equations).

The minor provides a comprehensive introduction to major areas of interest in environmental protection, namely air pollution and water pollution, through the three required courses. Further breadth in environmental engineering or depth in specific areas can be attained through the choice of appropriate elective courses.

Requirements for the minor include a minimum of five courses totaling at least 18 credits, chosen from the following: (1) three required courses: CHE 709, Fundamentals of Air Pollution and Its Control; CIE 645, Fundamental Aspects of Environmental Engineering; CHE 772, Physicochemical Processes for Water and Air Quality Control, *or* CIE 743, Environmental Sampling and Analysis; (2) a minimum of two elective courses from the following list: CHE 604, Chemical Engineering Thermodynamics; CHE 605, Mass Transfer and Stagewise Operations; CHE 606, Chemical Engineering Kinetics; CHE 772, Physicochemical Processes for Water and Air Quality Control; CIE 739, Industrial Wastewater Treatment; CIE 740, Rural Wastewater Engineering; CIE 743, Environmental Sampling and Analysis; CIE 744, Physicochemical Treatment Design; CIE 746, Biological Treatment Design; CIE 747, Introduction to Marine Pollution and Control; CIE 748, Solid Waste and Residuals Management; CIE 749, Water Chemistry; CIE 742, Hazardous Waste Management; CIE 753, Marine Pollution at Shoals Marine Laboratory; CIE 755, Design of Water Transmission Systems; CIE 756, Wastewater Microbiology; *or* 695, Engineering Projects (CHE, CIE, EE, ME).

Choice of elective courses should be made in consultation with the minor area adviser, Nancy Kinner, civil engineering, or Stephen S. T. Fan, chemical engineering. Students normally start this program in the junior year and should declare their intention to enter the program as early as possible during the sophomore year. During the final semester, students should apply to the dean to have the minor appear on the transcript.

Hydrology

The minor in hydrology is open to all students in the University. It consists of a minimum of six courses totaling at least 18 credits. Students must earn grades of C (2.00) or better and take no pass/fail courses. No more than 8 major requirement credits may be used. All courses in the program shall be selected by students in consultation with the hydrology minor adviser in the Department of Earth Sciences.

Required courses are (1) ESCI 401, Principles of Geology I, *or* ESCI 409, Environmental Geology; (2) ESCI 705, Principles of Hydrology; (3) ESCI 710, Groundwater Hydrology; (4–6) at least three of the following courses: ESCI 561, 703, 708, 747; CIE 642, 741, 742, 743, 745, 749; NR 757, 759, 760; WARM 504, 603, 700, 711, 713, 716, 718, 721; PBIO 717, 719.

Students are encouraged to declare their intention to enter the program before the end of the junior year. During the final semester, students should apply to the dean to have the minor appear on the transcript.

Illumination and Optical Engineering

The illumination and optical engineering minor is open primarily to juniors and seniors in the College of Engineering and Physical Sciences who desire an interdisciplinary exposure to the practical and technical aspects of light, vision, color, optics, and fiber optics. Students must have completed MATH 425, 426, 527, PHYS 407-408, and CS 410 or equivalent in order to take EE 760, 761, 762, and 763. Some of these courses, as well as some of the other courses listed below, may have additional prerequi-

sites. No course used for the minor can be expressly specified as being required in the student's major curriculum.

Requirements for the minor include a minimum of five courses totaling at least 18 credits, distributed as follows: (1) two required courses: EE 761, Optical Engineering; and EE 762, Illumination Engineering; (2) at least one of the following: EE 695, Electrical Engineering Projects (in illumination or optics); EE 717, Introduction to Digital Image Processing; EE 760, Introduction to Fiber Optics; EE 763, Lighting Design and Application; ME 761, Diffraction and Imaging Methods in Materials Science; CIE 530, Introduction to Civil Engineering; PSYC 710, Visual Perception; PHYS 607, Optics; ARTS 532, Introductory Drawing; ARTS 574, Architectural History; THEA 548, Stage Lighting Design and Execution; (3) two additional courses from the following list and/or category 2: EE/ME 771, Linear Systems and Control; EE/ME 772, Control Systems; EE 781, Physical Instrumentation; PHYS 505, General Physics III; ME 710, Solar Heating Systems; MATH 644, Probability and Statistics for Applications; MATH 645, Linear Algebra for Applications.

Students should declare their intent to enter this minor program before the second semester of their junior year after consultation with the minor adviser, Allen Drake, Department of Electrical and Computer Engineering. Students should complete an intent to minor form at the beginning of their minor program and a completion of minor form during their last semester. Also, students may apply to the dean to have the minor appear on their transcript.

Materials Science

The minor, administered by the Department of Mechanical Engineering, is open to all students of the University and offers a broad introduction to materials science. Students should contact the minor supervisor by midsemester of their junior year.

Students must complete at least 18 credits and a minimum of five courses as follows: ME 661 (required); one course from the group ME 760, ME 761, ME 762, and ME 766; one course from the group ME 730 and ME 731; additional courses from the group ME 695 (materials), 696 (materials), 730, 731, 760, 761, 762, 766, 795 (materials), CHE 701.

Interested students may consult James E. Krzanowski, Department of Mechanical Engineering.

Ocean Engineering

The ocean engineering minor is described under marine sciences on page 84.

Oceanography

The oceanography minor is described under marine sciences on page 84.

Other Programs

Independent Study and Projects

All departments within the college offer courses in independent study or in projects, the content varying with the current scientific and technological needs and with student and faculty interest.

Permission of the instructor and/or the department chairperson is required. (See the course descriptions for the independent study and project courses and for specific requirements.) The initiative for independent study courses in any area rests with the student.

Special Provisions

The requirement of a given course in any prescribed curriculum may be waived by the faculty of a student's college. The student's petition must be approved by his/her major adviser and the dean of the college. This power will usually be delegated by the faculty to the dean or to a committee. (Senate Rule 05.21(s): Waiver of Requirements in a Prescribed Curriculum.)

This rule offers students the opportunity to develop a somewhat individualized plan of study with intellectual incentives and opportunities in addition to those in a regular curriculum.

In addition, upon the recommendation of the department chairperson, superior students may be allowed to count credits from up to two 800-level courses toward both a bachelor's degree and a master's degree, provided that the students have been admitted to the master's program.

Research Opportunities

The talents and expertise of the faculty in all departments are reflected in the number of ongoing research projects. Undergraduates are included in many of these research projects with the intent of discovering and fostering their creative talents. In funded research projects, students may have an opportunity to receive pay while learning.

A multiplicity of research programs is reflected in special facilities: the Analog Computer Facility, Antenna Systems Laboratory, Bioelectronics Laboratory, Computation Science Center, Electronics Laboratory, Engineering Design and Analysis Laboratory, Fluid Mechanics Laboratory, Materials Laboratories, Mechanics Research Laboratory, Sanitary Engineering Laboratory, Solid State Laboratory, Space Science Center, Wind Tunnel and Water Tunnel Facility, and X-ray Laboratory.

Students have the opportunity to acquire applied experience in business and industry by working with faculty members who undertake client-sponsored professional projects in management and technical areas for business and industry, and for state and local governments.

Study Abroad Program

The College of Engineering and Physical Sciences has arranged an opportunity for its students to spend the fall semester of their junior year at the Technical University of Budapest in Budapest, Hungary. Courses at the TUB are taught in English and receive prior approval for degree credit. Students studying in Budapest, therefore, will graduate on schedule at UNH. A general education course on the language, geography, and culture of Hungary, taken at the TUB, is required. The foreign student office at the TUB will appoint a Hungarian adviser for each student and will assist in obtaining housing either in dormitories, with private families, or in apartments. Further information is available from the college's associate dean and the college's foreign exchange program coordinator, Professor A. Rucinski.

Preparing for Teaching

Students interested in mathematics education (elementary, middle/junior high, or secondary), chemistry and physics teaching, earth science teaching, or general science teaching should refer to the Department of Education section (page 26) and to the appropriate department for a description of the requirements.

Combined Programs of Study

In addition to pursuing a single major, students may combine programs of study as follows:
Minors: See page 17; see also pages 19 and 54 and Departmental Programs of Study in this section.
Second Majors: See page 17.
Interdisciplinary Majors: Many of the departments in the college offer ways of combining a major with another field of interest. See the descriptions that follow.
Dual-Degree Programs: See page 16.
Student-Designed Majors: See page 85.
Other combined and interdisciplinary opportunities: See page 82.

Departmental Programs of Study

In addition to the following departmental majors and options, departmental minors are offered in chemical engineering, chemistry, civil engineering, electrical engineering, engineering technology, geology, mathematics, applied mathematics, mechanical engineering, and physics.

Chemical Engineering

(For descriptions of courses, see page 109.)

Chemical engineering is concerned with the analysis and design of processes that deal with the transfer and transformation of energy and material.

The practice of chemical engineering includes the conception, development, design, and application of physicochemical processes and their products; the economic development, design, construction, operation, control, and management of plants for these processes; and activities relating to public service, education, and research.

Traditional employment areas in the chemical process industries include industrial chemicals, petroleum and petrochemicals, plastics, pharmaceuticals, metals, textiles, and food. Chemical engineers are also working in increasing numbers in the areas of energy engineering, pollution abatement, and biochemical and biomedical engineering; in addition, they are employed by many government laboratories and agencies as well as private industries and institutions.

The curriculum trains students to enter the diverse areas of employment or graduate study. The considerable number of electives in the curriculum provides flexibility for individuals to design programs that fulfill their needs and interests. They also provide an opportunity for students to elect departmental options or interdisciplinary minors.

A minimum of 129 credits is required for graduation with the degree of bachelor of science in chemical engineering. There are nine electives in the chemical engineering curriculum. Six of these are for the general education requirements. The remaining three electives should consist of two chemical engineering electives and one engineering elective outside of the department. In fulfilling general education requirements, no technology courses in Group 3 will be accepted.

Students are required to obtain a minimum 2.00 grade-point average in CHE 501-502 and in overall standing at the end of the sophomore year in order to continue in the major.

Freshman Year	Fall	Spring
ENGL 401, Freshman English	—	4
MATH 425-426, Calculus I and II	4	4
PHYS 407, General Physics I	—	4
CHEM 405, General Chemistry	4	—
CHE 410, Survey of Current Energy and Pollution Control Technology	—	4
Electives* (2)	8	—
	16	16
Sophomore Year		
CHEM 683-684, Physical Chemistry I and II	3	3
CHEM 685-686, Physical Chemistry Laboratory	2	2
MATH 527, Differential Equations with Linear Algebra	4	—
CS 410F, Introduction to Scientific Programming	—	4
PHYS 408, General Physics II	4	—
CHE 501-502, Introduction to Chemical Engineering I and II	3	3
Elective*	—	4
	16	16
Junior Year		
CHEM 547-548, Organic Chemistry	3	3
CHEM 549, Organic Chemistry Laboratory	2	—
CHE 601, Fluid Mechanics and Unit Operations	3	—
CHE 602, Heat Transfer and Unit Operations	—	3
CHE 603, Applied Mathematics for Chemical Engineers	4	—
CHE 604, Chemical Engineering Thermodynamics	—	4
CHE 612, Chemical Engineering Laboratory I	—	3
Electives* (2)	4	4
	16	17
Senior Year		
CHE 605, Mass Transfer and Stagewise Operations	3	—
CHE 606, Chemical Engineering Kinetics	3	—
CHE 608, Chemical Engineering Design	—	3
CHE 613, Chemical Engineering Laboratory II	3	—
CHE 752, Process Dynamics and Control	—	4
Electives* (4)	8	8
	17	15

* See page 53 for degree requirements.

Energy Option

This option covers the major areas of current interest in the energy field. The required courses provide students with a general background knowledge of fossil fuels, nuclear power, solar energy, and other alternative energy resources. The elective courses will permit the student to study topics of special interest in more depth or gain a broader perspective on energy and some closely related subjects. Three courses are required, and a minimum of two additional courses of at least 3 credits each should be selected from the electives list. Students interested in the energy option should declare their intention during the sophomore year to the department faculty. They may consult with Stephen S. T. Fan.

Required Courses	Credits
CHE 705, Natural and Synthetic Fossil Fuels	4
CHE 712, Introduction to Nuclear Engineering	4
ME 710, Solar Heating Systems	3
	11
Elective Courses	
CHE 695, Chemical Engineering Project	3–4
CHE 696, Independent Study	3–4
CHE 772, Physicochemical Processes for Water and Air Quality Control	4
ME 705, Thermal System Analysis and Design	3
	6–8

Environmental Engineering Option

The chemical engineering program, with its substantial requirement in chemistry, fluid dynamics, heat transfer, mass transfer, unit operations, and reaction kinetics, provides students with a unique preparation to deal with many aspects of environmental pollution problems. The option gives students a special focus on the application of chemical engineering principles and processes to the solution of problems relating to air pollution, water pollution, and the disposal of solid and hazardous waste. Three required courses must be selected, plus two electives from the electives list. Each course must carry a minimum of 3 credits. Students interested in the environmental engineering option should declare their intention during the sophomore year to the department faculty. They may consult with Stephen S. T. Fan.

Required Courses	Credits
CHE 709, Fundamentals of Air Pollution and Its Control	4
CHE 772, Physicochemical Processes for Water and Air Quality Control	4
CIE 748, Solid Waste and Residuals Management	3
	11

Elective Courses	
CHE 695, Chemical Engineering Project	3–4
CHE 696, Independent Study	3–4
CIE 746, Biological Treatment Design	3
CIE 749, Water Chemistry	3
	6–8

Chemistry

(For descriptions of courses, see page 110.)

"Chemistry is everywhere. From agriculture to health care, chemistry extends life and improves its quality. From disposable diapers to space suits, chemistry provides new materials—for clothing, shelter, and recreation. From computer chips to fiber optics, chemistry is the foundation of today's high technology" (American Chemical Society, 1987).

Study in chemistry leads everywhere—to careers in education, law, forensics, medicine, biotechnology, environmental protection, technical sales, semiconductors, and industrial chemicals production.

Students interested in chemistry may major in one of four programs offered in the department, depending upon their plans for a career. Since the required chemistry courses in each degree program are the same in the first year, it is easy to change from one program to another.

In each of the programs, students should register for the following courses in the first year: CHEM 405 (first semester), General Chemistry; CHEM 406 (second semester), Quantitative Analysis; MATH 425 (first semester), Calculus I; and MATH 426 (second semester), Calculus II. Students interested in a chemistry program may consult with the coordinator of undergraduate studies in the department.

Bachelor of Science in Chemistry

This curriculum prepares students for careers requiring a thorough knowledge of chemistry and provides a strong foundation for graduate study in chemistry or in interdisciplinary areas. The curriculum requires a greater depth in chemistry and physics than do the other degree programs.

Requirements

1. Satisfy general education requirements.
2. For specific course requirements, see the accompanying chart.

Bachelor of Arts, Chemistry Major

This curriculum offers students the opportunity to combine a chemistry major with other interests, for example, the prehealing arts, education, or business.

Requirements

1. Satisfy general education requirements.
2. Satisfy the bachelor of arts degree requirements (see page 16).
3. For specific course requirements, see the accompanying chart.

Chemistry Baccalaureate Degree Requirements

Chemistry Courses	B.S.	B.A.
405*, General	x	x
406 & 407, Quant. Analysis	x	x
547 & 549, Organic I	x	x
548 & 550, Organic II	x	x
574, Intro. Inorganic	x	x
683 & 685, Physical I	x	x
684 & 686, Physical II	x	x
762 & 763, Instrum. Analysis	x	x
698, Seminar	x	
699, Thesis	x	
755 & 756, Adv. Organic	x	
774 & 775, Adv. Inorganic	x	
776, Physical III	x	
708, Spectroscopic Invest.		
778, Large Molecules		

Other Requirements

All majors: MATH 425 and 426, Calculus I and II.

B.S. degree: PHYS 407-408, General Physics I and II; CS 410C or 410F, Introduction to Scientific Programming; two chemistry-related courses (only one of which may be a chemistry course).†

B.A. degree, chemistry major: PHYS 407, General Physics I, or PHYS 401-402, Introduction to Physics I and II; two other CHEM courses, except 698, or two approved chemistry-related courses.†

*CHEM 403-404 may be substituted for CHEM 405, but this is not recommended.
†Suggested courses: MATH 527, 528; PHYS 505; EE 620; BCHM 658, 751.

Bachelor of Arts, Chemistry and Physics Teaching

This major is designed for students who wish to teach chemistry and physics in secondary schools. The number of positions available for teaching only chemistry or physics is limited, and there are more opportunities to teach both subjects on the secondary-school level. Chemistry and physics teaching majors will have good preparation for teaching these subjects and will have the necessary mathematics and education background.

Requirements

1. Satisfy general education requirements.
2. Satisfy the bachelor of arts degree requirements (see page 17).
3. Chemistry requirements: 405, General Chemistry, or 403-404, General Chemistry; 406, 407, Quantitative Analysis; 545, 546 or 547-548 and 549-550, Organic Chemistry; 683-684 and 685-686, Physical Chemistry I and II.
4. Physics requirements: 407, General Physics I; 408, General Physics II; 505, General Physics III; 605, Experimental Physics I. PHYS 406, Introduction to Modern Astronomy, is strongly recommended.
5. Math requirements: 425, Calculus I, and 426, Calculus II.
6. All education courses in the teacher preparation program (see page 26).

Environmental Option

This option incorporates studies of environmental issues involving chemistry into the B.S. and B.A. chemistry major programs. The required seminar course will expose students to a wide variety of contemporary environmental issues, and required laboratory research will emphasize some of the experiments required to solve environmental problems. The student in consultation with the environmental coordinator will choose as electives four of a selection of non-chemistry courses that contain applications of chemistry to areas of environmental concern.

Required Courses	Credits
CHEM 520, Seminar in Environmental Chemistry	2
CHEM 696, Independent Study	4 or 8
or CHEM 699, Thesis	8
	14 or 18

Elective Courses

Coherent program of 4 courses with environmental content chosen from the environmental coordinator's list — 12–16

General Science Certification

See page 28.

Civil Engineering

(For descriptions of courses, see page 111.)

Civil engineers are concerned with the planning, design, and construction of public and private facilities, which must not only provide safe, efficient service to the users but must, in addition, be compatible with the environment (both natural and human) in which they are placed.

The program leads to a bachelor of science degree in civil engineering. The strong analytical basis of the program prepares graduates for many career opportunities. They may enter professional practice or pursue further study in graduate school. Undergraduates study the basic sciences and mathematics, as well as engineering science, analysis, and design.

First Year	Fall	Spring
CIE 400, CIE Lectures	1	—
CIE 505, Surveying	—	4
MATH 425, 426, Calculus I, II	4	4
CHEM 403, 404, General Chemistry	4	4
ENGL 401, Freshman English	4	—
PHYS 407, General Physics I	—	4
Elective (1) general education requirement*	4	—
	17	16

Sophomore Year		
CIE 528, 529, Mechanics I, II	4	4
PHYS 408, General Physics II	4	—
MATH 527, Differential Equations with Linear Algebra	4	—
MATH 644, Probability and Statistics for Applications	—	4
CS 410C or F, Introduction to Scientific Programming	4	—
CIE 530, Introduction to Civil Engineering Applications	—	3
Elective (1) engineering science**	—	3
Elective (1) general education requirement*	—	4
	16	18

Junior Year		
CIE 622, Engineering Materials	—	4
CIE 642, Fluid Mechanics	4	—
CIE 645, Fundamental Aspects of Environmental Engineering	—	4
CIE 681, Classical Structural Analysis	3	—
Elective (1) Mathematics	4	—
CIE 633, Systems Analysis	—	3
CIE 665, Soil Mechanics	4	—
CIE 760, Foundation Design	—	4
CIE 520, Environmental Pollution and Protection (general education 3, Tech.)	4	—
	19	15

Senior Year		
CIE 788, Project Planning and Design	—	4
CIE 774, Reinforced Concrete Design	4	—
Electives (3) general education requirements*	8	4
CIE electives (4)***	6	6
	18	14

* See page 53 for degree requirements.
** Approved list available in CIE office.
*** Minimum of one approved design course is required

The general education, engineering science electives, and mathematics electives are chosen to meet requirements of the University, the national accreditation board (ABET), and the department. The engineering science elective is an engineering course taken from an engineering department or program other than civil engineering. Students must have the proper prerequisites to select such a course. A complete, current list of acceptable general education sequences, engineering science electives, and mathematics electives is available from the department.

To enter required 600-level CIE courses, a CIE major must have completed the mechanics sequence (CIE 528 and 529) with a minimum of a 2.00 grade-point average, completed CIE 530, and have a minimum of a 2.00 cumulative grade-point average. Exceptions to these requirements will be granted only under extremely unusual circumstances and will require departmental approval of a written petition by the student's adviser.

All CIE 600- and 700-level courses are intended for CIE majors only. A non-CIE major may enter one of these courses only by permission of the instructor. Non-CIE majors are limited to a maximum of 20 credits of 600- and 700-level courses prior to transferring into the CIE department. Transfers into the CIE department should have a minimum cumulative grade-point average of 2.50 and have taken some math and science courses.

A minimum of 133 total credits is required for graduation. To qualify for graduation, the student must have a minimum of a 2.00 average in all CIE courses.

Computer Science

(For descriptions of courses, see page 117.)

Computer scientists are concerned with all aspects of the design, implementation, and application of computers. They are concerned with problem solving in general, with particular emphasis on the design of computer-efficient solutions. This involves detailed understanding of the nature of algorithms, the software implementation techniques necessary to utilize these algorithms on computers, and a knowledge of how algorithms can be combined in a structured manner to form highly complex software systems.

The program leads to a B.S. in computer science and is designed to prepare students for employment in the computer field or to pursue graduate study in computer science. The program emphasizes the application of computer science theory and principles but also includes a broad background in basic mathematics and an introduction to computer hardware. Most courses require heavy use of the computer, and the laboratories stress hands-on experience with computer equipment.

Computer science majors must obtain an overall grade-point average of 2.00 or better in all required computer science, mathematics, and electrical engineering courses in order to graduate. If at the end of any semester, including the first, a student's cumulative average in these courses falls below 2.00, the student may not be allowed to continue as a CS major.

Requirements

1. Satisfy general education requirements. PHYS 407-408, MATH 425, and PHIL 424 are required and may be used to fulfill requirements in the appropriate general education group. CS 401 and CS 406 may not be used to fulfill general education requirements.

2. One additional biological or physical science course.

3. Two additional approved courses chosen from the humanities, social sciences, and arts.

4. Ten core courses in each of which the student must obtain a grade of C– or better. Before taking a course having any of these ten courses as a prerequisite, the prerequisite course(s) must be passed with a grade of C– or better: CS 415 and 416, Introduction to Computer Science I and II; CS 515, Data Structures; CS 610, Operating System Fundamentals; CS 611, Assembly Language Programming and Machine Organization; CS 671, Programming Language Concepts and Features; MATH 425 and MATH 426, Calculus I and II; MATH 531, Mathematical Proof; MATH 532, Discrete Mathematics.

5. One computer science theory course chosen from: CS 658, Analysis of Algorithms, or CS 659, Introduction to the Theory of Computation.

6. Three approved computer science courses chosen from CS courses numbered above 650.

7. One approved course chosen from CS courses numbered above 650 or from the following list of mathematics courses: MATH 645, Linear Algebra for Applications; MATH 735, Probability (only if taken with MATH 736, Statistics); MATH 761, Abstract Algebra; MATH 776, Logic; MATH 783, Set Theory.

8. One course in probability and statistics chosen from: MATH 644, Probability and Statistics for Applications; or MATH 736, Statistics (with MATH 735, Probability, as prerequisite).

9. Two electrical engineering courses: EE 543, Introduction to Digital Systems, and EE 612, Computer Organization.

Earth Sciences

(For descriptions of courses, see page 121.)

The courses offered in the Department of Earth Sciences cover the broad spectrum of earth sciences, with emphases on geology, hydrology, geochemistry, and oceanography. The curriculum encompasses a group of related studies concerned with an understanding of the Earth: its size, shape, and constitution; the processes that are now, or have formerly been, at work upon its surface, including tectonic cycles, ocean currents, the hydrologic cycle, energy flows, biogeochemical cycles, and climate changes; and the origin and evolution of life. Studies in these areas are based on a foundation of basic mathematics, physics, and chemistry.

The need for people trained in the earth sciences has been increasing in response to society's growing concern with sound environmental and resource management, including the disposal of waste on land and in the atmosphere and oceans; the management of water resources; the development of energy and mineral resources; and the assessment of environmental hazards. In addition, the demand for well-trained secondary school teachers of earth sciences has been steadily increasing.

Four undergraduate degree programs are offered through the Department of Earth Sciences. These programs prepare students for advanced study in the geosciences; for entry-level professional employment in public or private institutions concerned with environmental and resource management, including consulting firms, government agencies, energy- and resource-extraction firms, utilities, and nonprofit organizations; and for secondary-school teaching of earth sciences.

Bachelor of Science in Geology

This program represents a strong concentration in the earth and cognate sciences and is especially well suited for students who plan to continue their studies in graduate school. Beyond a central core of courses, there is sufficient flexibility in course selection so that students may, in consultation with their academic advisers, orient the program toward a particular facet of the earth sciences (e.g., mineralogy-petrology, oceanography, hydrogeology, geophysics-structural geology, geomorphology-glacial geology, geochemistry, paleontology-stratigraphy). Students are encouraged to attend an off-campus field camp, for which scholarship funds may be available.

Requirements

1. Satisfy the general education requirements.

2. Satisfactorily complete MATH 425 and 426, CHEM 403-404 (or CHEM 405), and PHYS 407-408 and 505. Some of these courses may also satisfy Group 2 and part of Group 3 of the general education requirements.

3. Complete a minimum of twelve courses in earth sciences, which should include ESCI 401, Principles of Geology I, *or* ESCI 409, Environmental Geology; ESCI 402, Principles of Geology II; ESCI 501, Introduction to Oceanography; ESCI 512, Principles of Mineralogy; ESCI 614, Optical Mineralogy and Petrography; ESCI 530, Field Methods; ESCI 631, Structural Geology; ESCI 561, Surficial Processes; ESCI 652, Paleontology and Biostratigraphy; and three approved earth sciences 700-level electives.

4. Complete four approved electives. The following should be considered: one additional 700-level course in the earth sciences; additional courses in mathematics, chemistry, and physics; as well as courses in computer science, engineering, and the biological sciences; and an off-campus field camp.

Bachelor of Science in Hydrology

The hydrology major provides a sound foundation for understanding and managing fresh-water resources. It prepares students for entry-level professional employment in firms and agencies and for graduate study.

The hydrology major is an interdisciplinary major offered by the departments of earth sciences and civil engineering. Each hydrology major is assigned to an adviser, who helps with course selection and provides general guidance.

University General Education Requirements: Students are required to complete the University general education requirements. Completion of the hydrology core curriculum automatically satisfies the requirement for one course in quantitative reasoning (Group 2) and two physical science courses in Group 3. To complete the requirements in Group 3, hydrology majors must take one of the following

biological science courses: PBIO 412, PBIO 421, ENTO 402, WILD 433, or ZOOL 412.

Core Courses: MATH 425, 426, 527; MATH 644 or RECO 528; PHYS 407-408; CIE 642; CHEM 403-404 (or CHEM 405); CS 410C or F; WARM 603; ESCI 401 or 409, 561; ESCI 703 or CIE 741; ESCI 705, 710; CIE 743, 745, or ESCI 747.

Major Electives: Four approved electives are to be selected with the guidance of the adviser. Qualifying courses may be selected from a list of hydrogeology, biohydrology, water quality, fluid flow, water resources management, and weather and climate courses offered in various departments in the University.

For a list of the elective courses and for further information about the hydrology major, contact the coordinator, S. Lawrence Dingman, Department of Earth Sciences.

Bachelor of Arts, Earth Sciences Major

This program offers students an opportunity to obtain a broad liberal education and a general background in earth sciences with a greater degree of freedom in choosing electives than in the bachelor of science program. By a careful choice of electives, students can prepare for graduate school, business, or industry.

Requirements

1. Satisfy the general education requirements.
2. Satisfy the bachelor of arts degree requirements (page 16).
3. Complete a minimum of eight courses in the department (with a C– or better) including ESCI 401, Principles of Geology I, or ESCI 409, Environmental Geology; ESCI 402, Principles of Geology II; ESCI 512, Principles of Mineralogy; and five upper-level earth sciences courses, two of which must be 700 or above.
4. Math requirements: 425, Calculus I, and 426, Calculus II.

It is strongly advised that students complete, as early as possible, a year each of college chemistry and physics.

Bachelor of Arts, Earth Science Teaching Major

This program is specifically designed to prepare students to teach earth sciences in secondary school. Upon graduation from this program, students receive full teacher certification that is recognized in most states.

Requirements

1. Satisfy the general education requirements.
2. Satisfy the bachelor of arts degree requirements (page 16).
3. Complete the following: ESCI 401, Principles of Geology I, or ESCI 409, Environmental Geology; ESCI 402, Principles of Geology II; ESCI 501, Introduction to Oceanography; GEOG 473, The Weather; CHEM 403-404, General Chemistry; PHYS 401-402, Introduction to Physics I and II; PHYS 406, Introduction to Modern Astronomy; plus 12 approved elective credits from intermediate and/or advanced earth sciences courses.
4. Math requirements: 425, Calculus I, and 426, Calculus II.
5. Satisfy the secondary-school teacher education program. (See page 26.)

General Science Certification

See page 28.

Electrical Engineering

(For descriptions of courses, see page 126.)

The Department of Electrical and Computer Engineering offers an accredited program in electrical engineering. Within this program, students may choose options in computer engineering, electrical engineering systems, or pursue the student-designed option.

Electrical engineers are concerned with the design, development, and production of products and systems that involve electrical signals and power. Thus, broad areas of applications are covered, such as monitoring outer space and the ocean floor, developing robots for factories and biomedical instruments for hospitals, and building microcomputers and power systems. They use such principles and techniques as computer-aided design, optics, acoustics, electronics, automatic control theory, and electromagnetics. Further, it is essential for electrical and computer engineers to include a variety of realistic constraints, such as economic factors, safety, reliability, aesthetics, ethics, social implications, and environmental impact.

The electrical engineering curriculum prepares students for productive employment as electrical engineers, and for graduate work in electrical engineering and related areas such as space science and business administration. It is compatible with the dual-degree program described on page 16.

At UNH, the cornerstone of the electrical engineering program is the involvement of students in the solution of real-world problems. During the freshman and sophomore years, students take basic courses in mathematics and science, learn how to use the computer, and receive introductory experience in electric circuits, logic design, and electronics. In the junior and senior years, students learn more about the techniques necessary for the analysis and design of electrically based systems.

In addition to general university requirements, the department has a number of grade-point average and credit requirements:

1. For an electrical engineering major to enter the junior year and take any of the first-term junior courses (EE 617, 645, 651, or 612), he or she must have taken, and achieved a cumulative grade-point average of 2.10, in all of the following freshman and sophomore courses: MATH 425, 426, 527; PHYS 407, 408; and EE 541, 543, 544, and 548.
2. Any electrical engineering major whose cumulative grade-point average in EE courses is less than 2.00 during any three semesters will not be allowed to continue as an electrical engineering major.
3. Electrical engineering majors must achieve a 2.00 grade-point average in EE courses as a requirement for graduation.

To make an exception to any of these departmental requirements based on extenuating circumstances, students must petition the department's undergraduate committee. Students should also be aware of the CEPS requirement for a two-course sequence in their general education requirements in order to provide depth. Mindful of these rules, students, with their advisers' assistance, should plan their programs based on the distribution of courses in the chart below for a total of at least 128 credits.

Basic Curriculum for B.S. in Electrical Engineering

(First two years are common to all options)

Freshman Year	Fall	Spring
Core Courses		
CHEM 405, General Chemistry*	4	—

MATH 425, 426, Calculus I and II	4	4
PHYS 407, 408, General Physics I and II	4	4
Elective, writing skills	—	4
CS 410C, Introduction to Scientific Programming	—	4
Elective, general education requirement***	4	—
Total	16	16

Sophomore Year
Core Courses

MATH 527, Differential Equations with Linear Algebra	4	—
EE 541, Electrical Circuits	4	—
EE 543, Introduction to Digital Systems	4	—
EE 544, Engineering Analysis	—	3
EE 548, Circuits and Electronics	—	4
ME 523, Introduction to Statics and Dynamics	—	3
Elective, math-science elective**	—	3 or 4
Electives (2), general education requirements	4	4
Total	16	17 or 18

Junior Year
Core Courses

EE 617, 618, Junior Laboratory I and II	2	2
EE 612, Computer Organization	4	—
EE 645, Electrical Networks	3	—
EE 651, Advanced Electronics I	3	—
EE 603, Electromagnetic Fields and Waves	—	3
EE 647, Random Processes in Electrical Engineering	—	2
EE 657, Electromechanical Energy Conversion	—	2
EE 690, 691, Engineering Design Principles I and II	.5	.5
Elective, math-science elective**	3 or 4	—
Elective, general education requirement	—	4
Subtotal	15.5 or 16.5	13.5

Computer Engineering Option

CS 610, Operating System Fundamentals	—	4
Total	15.5 or 16.5	17.5

Electrical Engineering Systems Option

EE 652, Advanced Electronics II	—	4
Total	15.5 or 16.5	17.5

Senior Year
Core Courses

EE 771, Linear Systems and Control	3	—
EE 790, Engineering Design Experience	—	0
Electives (3), 2 general education and 1 free elective	4	8
Subtotal	7	8

Computer Engineering Option

EE 711, Digital Systems	4	—
EE 714, Real-Time Computer Applications	—	4
EE 757 *or* 772, Communication *or* Control Systems	4	or 4
Elective, approved professional elective	4	or 4
Total	15	16

Electrical Engineering Systems Option

EE 757, Fundamentals of Communication Systems	4	—
EE 772, Control Systems	—	4
Electives (2) approved professional electives	4	4
Total	15	16

*CHEM 403-404 may be required for students whose preparation in chemistry is inadequate.
**Math-science electives are courses chosen from the following list: MATH 645, 646, 647, 744; ME 503, 608 (students may take either ME 503 or ME 608, but not both, unless they have taken a biological science course from Group 3 of the general education requirements); PHYS 505, 506.
***See page 53 for requirements.

Options and Minors

In the junior year, students complete the core courses and begin studying in a chosen option. Students must choose one of the three options and additionally may elect one of the various minors (see page 54). The options, described in the following paragraphs, provide for professional electives so that students may pursue their individual interests. In addition, the senior year features many opportunities for individual or group projects. Each option is made up of five courses and builds upon the background acquired in the core curriculum.

Computer Engineering Option

During the past several years, advances in the technology of electronic circuit manufacturing have vastly reduced the costs of digital computers. This low cost, coupled with flexibility, has allowed them to be used in a broad variety of applications, from data processing in a small retail store to controlling a robot in a manufacturing plant. Since computers are basically electronic devices, it is primarily the job of electrical engineers to design or specify the purchase of the computer and integrate it into larger systems. To do so requires a knowledge of both hardware (circuits) and software (programming) concepts. In this option, students will learn to design, build, and test systems involving digital computers.

The following are required courses: EE 711, EE 714, CS 610. As electives, students take EE 757 or EE 772 and one approved professional elective chosen in consultation with the adviser to meet students' professional objectives.

Electrical Engineering Systems Option

The electrical engineering systems option provides students with a background in electrical systems, including communication and control. An effort is made to balance the theory and the applications so that students will appreciate both system development and system implementation. In addition to the required courses, there are two additional professional elective courses that allow students to delve further into areas of interest.

Required courses include EE 652, EE 757, and EE 772. For electives, students choose two courses in consultation with the adviser.

Student-Designed Option

This option is for the unusual student whose grade-point average is at least 2.70 and who has well-defined academic goals that cannot be satisfied by either of the regular options. The student and adviser prepare an option proposal that includes a statement of the student's goals and a listing of the option courses that will be taken. The option must include at least one EE course with an engineering design content of fifty percent or greater. Each student's proposal requires approval by the department's undergraduate committee.

Engineering Technology

(For descriptions of courses, see page 128.)

Engineering technology requires the application of engineering and scientific knowledge and methods combined with technical skills in support of engineering activities. Normally engineering technology is not concerned with the development of new principles and methods. The engineering technology program offers only junior- and senior-level work. Students

admitted to this program must have an appropriate associate degree from the New Hampshire Technical Institute, the Vermont Technical College, Keene State College, or an equivalent T.A.C.-A.B.E.T.– accredited institution or evidence of ability to successfully complete the requirements of the program. Curricula in electrical engineering technology and mechanical engineering technology are offered. Students may continue study in their fields of specialization, select electives that broaden their educational backgrounds, and participate in project courses where, as part of a technology team, their talents are applied in solving real problems.

Students interested in an engineering technology program may consult with the program chairperson, David A. Forest, 138 Parsons Hall, (603) 862-1827.

Electrical Engineering Technology

Junior Year	Fall	Spring
ET 671, Digital Systems	—	4
ET 677, Analog Systems	4	—
ET 634, Economics of Business Activities	3	—
ET 674, Control Systems and Components	—	4
Technical elective	4	—
Technical elective	—	4
ET 695A, Analytical Methods in Technology	2	—
Electives (2)	4	4
	17	16

Senior Year		
Technical elective	—	3 (or 4)
ET 691, Electrical Engineering Technology Project	4	4
ET 633, Business Organization and Law	—	3
ET 637, Heat and Fluid Power I	4	—
Technical elective	4	—
Electives (3)	4	8
	16	18 (or 19)

Technical Electives

Electrical/Electronics Option

ET 680 Communications and Fields	4
CS 410C Introduction to Scientific Programming	4
ET 690 Microcomputer Technology	4
ET 683 Advanced Electronic Design Methods	3

Computer Science Option

CS 415 Introduction to Computer Science I	4
CS 416 Introduction to Computer Science II	4
CS 515 Data Structures and Algorithms	4
CS 610 Operating System Fundamentals	4
CS 658 Analysis of Algorithms	4
CS 659 Introduction to the Theory of Computation	4
CS 671 Programming Language Concepts and Features	4
CS 727 Computer Communications Software Design	4
CS 730 Introduction to Artificial Intelligence	4
CS 770 Computer Graphics	4

All students entering the electrical engineering technology program should have a minimum of 12 credits of college-level mathematics, including two semesters of calculus. Students without this background will be required to take either MATH 426 or MATH 527 during the first semester of their junior year. The student's adviser will determine which of these courses is most appropriate for the student's program. Electrical engineering technology students must also complete a minimum of 9 credits of courses in communication skills. Computer science technical electives are contingent on space availability and the appropriate prerequisites being satisfied.

Mechanical Engineering Technology

Junior Year	Fall	Spring
ET 637 and 638, Heat and Fluid Power I and II	4	4
ET 641, Production Systems	3	—
ET 675, Electrical Technology	4	—
ET 644, MET Concepts in Design and Analysis	—	4
CS 410, Introduction to Scientific Programming	—	4
ET 695A, Analytical Methods in Technology	2	—
Electives (2)	4	4
	17	16

Senior Year		
ET 651, Mechanical Engineering Technology Project	4	4
ET 633, Business Organization and Law	—	3
ET 634, Economics of Business Activities	3	—
ET 645, Instrumentation	4	—
ET 674, Control Systems and Components	—	4
Electives (3)	4	8
	15	19

All students entering the mechanical engineering technology program should have a minimum of 12 credits of college-level mathematics, including two semesters of calculus. Students without this background will be required to take either MATH 426 or MATH 527 during the first semester of their junior year. The student's adviser will determine which of these courses is most appropriate for the student's program.

All mechanical engineering technology students must satisfactorily complete CHEM 403 or offer evidence of equivalent coursework. Students in this program must also complete a minimum of 9 credits of courses in communication skills.

Mathematics

(For descriptions of courses, see page 150.)

A variety of programs, fourteen in all, is offered by the Department of Mathematics. These programs provide flexibility through elective choices, but also they are designed to maximize educational and employment opportunities. Each student must enroll in one specific program; however, changes between programs can usually be accommodated.

The first two years of all programs are similar. In the first year, students are expected to take MATH 425 and 426 as well as an introductory computer science course (either CS 410, Introduction to Scientific Programming, or CS 415-416, Introduction to Computer Science I and II). In the sophomore year MATH 527, 528, and 531 keep a student on schedule in most programs. General education courses will normally be completed by the end of the sophomore year.

In addition to the degree programs, the department has an active interest in the actuarial profession and is an examination center for the Society of Actuaries. Recommended courses for those interested in actuarial science can be included in either a bachelor of science or a bachelor of arts program.

Standards for Graduation

To qualify for graduation, departmental majors must complete all except two of the courses that are used to satisfy their major requirements with a grade of C– or better and attain an overall grade-point average of at least 2.00 in these courses.

Bachelor of Arts, Mathematics Major

This program offers a broader liberal arts education than the bachelor of science programs. By a careful selection of electives, students can shape this major into a preparation for graduate school, business, or industry.

Requirements

General education requirements (MATH 425 satisfies the requirement in Group 2, quantitative reasoning.)*
Foreign language requirement as defined by the University for the B.A. degree.

MATH/CS required courses
CS 410, Introduction to Scientific Programming
MATH 425-426, Calculus I and II
MATH 527, Differential Equations with Linear Algebra
MATH 528, Multidimensional Calculus
MATH 531, Mathematical Proof
MATH 644, Probability and Statistics for Application; or MATH 735, Probability, and MATH 736, Statistics
MATH 761, Abstract Algebra
MATH 762, Linear Algebra
MATH 767, One-Dimensional Real Analysis
Two approved MATH/CS electives (MATH 736 or chosen from MATH courses numbered 532 and above or CS courses numbered 515 and above)

Bachelor of Science in Mathematics

This program offers the strongest concentration in mathematics, requiring courses that are intended to prepare the student for graduate work in mathematics. Through a judicious choice of electives, students may construct a stronger pregraduate program or slant the program toward a career in business or industry.

Requirements

General education requirements (MATH 425 satisfies the requirement in Group 2, quantitative reasoning.)*
Foreign language requirement as defined by the University for the B.A. degree in Russian, German, or French.
Other required courses
PHYS 407-408, General Physics I and II (satisfies two of the three courses for general education in Group 3, biological science, physical science, and technology)

MATH/CS required courses
CS 410, Introduction to Scientific Programming
MATH 425-426, Calculus I and II
MATH 527, Differential Equations with Linear Algebra
MATH 528, Multidimensional Calculus
MATH 531, Mathematical Proof
MATH 644, Probability and Statistics for Applications; or MATH 735, Probability, and MATH 736, Statistics
MATH 761, Abstract Algebra
MATH 762, Linear Algebra
MATH 767, One-Dimensional Real Analysis
MATH 784, Topology
MATH 788, Complex Analysis
One approved MATH elective (MATH 736 or chosen from MATH courses numbered 532 and above)
One approved MATH or CS elective (chosen from MATH courses numbered 532 and above or CS courses numbered 515 and above)

Bachelor of Science in Mathematics Education

This professional degree program prepares students for mathematics teaching at the elementary, middle/junior high, or secondary level. The program is coordinated with the education department's teacher certification programs. Students may complete the degree requirements for middle/junior high or secondary option with full teacher certification in either four or five years. For the elementary option, full certification requires the five-year program. Students electing the four-year option must plan for one semester of student teaching (EDUC 694) in their senior year and should consult with the mathematics department program adviser concerning the schedule of mathematics courses. The five-year program involves a required yearlong teaching internship in the fifth year. (The internship can be coupled with other graduate work leading to a master's degree.) See Education, page 26.

Elementary Option Requirements

General education requirements (MATH 425 satisfies the requirement in Group 2, quantitative reasoning.)*
Other required courses
PHYS 406, Introduction to Modern Astronomy (satisfies one of three courses for general education in Group 3, biological science, physical science, and technology)
EDUC 500, Exploring Teaching
EDUC 700, Educational Structure and Change
EDUC 701, Human Development and Learning: Education Psychology
EDUC 705, Alternative Perspectives on the Nature of Education
EDUC 706, Introduction to Reading Instruction in the Elementary Schools

MATH/CS required courses
CS 410, Introduction to Scientific Programming
MATH 419, Evolution of Mathematics
MATH 425-426, Calculus I and II
MATH 531, Mathematical Proof
MATH 621, Number Systems for Teachers
MATH 622, Geometry for Teachers
MATH 623, Topics in Mathematics for Teachers
MATH 644, Probability and Statistics for Applications
MATH 645, Linear Algebra for Applications
MATH 657, Geometry
MATH 703, The Teaching of Mathematics, K–6
MATH 791, The Teaching of Mathematics, 7–12
One additional approved elective (usually taken from MATH 532, Discrete Mathematics; MATH 656, Introduction to Number Theory; MATH 658, Topics in Geometry; MATH 698, Senior Seminar)

Middle/Junior High School Option Requirements

General education requirements (MATH 425 satisfies the requirement in Group 2, quantitative reasoning.)*

Other required courses
EDUC 500, Exploring Teaching
EDUC 700, Educational Structure and Change
EDUC 701, Human Development and Learning: Educational Psychology
EDUC 705, Alternative Perspectives on the Nature of Education

MATH/CS required courses
CS 410, Introduction to Scientific Programming
MATH 419, Evolution of Mathematics
MATH 425-426, Calculus I and II
MATH 531, Mathematical Proof
MATH 621, Number Systems for Teachers
MATH 622, Geometry for Teachers
MATH 644, Probability and Statistics for Applications; or MATH 735, Probability, and MATH 736, Statistics
MATH 645, Linear Algebra for Applications; or MATH 762, Linear Algebra
MATH 657, Geometry
MATH 698, Senior Seminar
MATH 761, Abstract Algebra
MATH 791, The Teaching of Mathematics, 7–12
One additional approved MATH/CS elective (usually taken from MATH 527, Differential Equations with Linear Algebra; MATH 532, Discrete Mathematics; MATH 656, Introduction to Number Theory; MATH 658, Topics in Geometry; MATH 736, Statistics; MATH 767, One-Dimensional Real Analysis; MATH 784, Topology)

Secondary Option Requirements

General education requirements (MATH 425 satisfies the requirement in Group 2, quantitative reasoning.)*

*CS 401 may not be used to satisfy a Group 3 requirement.

Other required courses
EDUC 500, Exploring Teaching
EDUC 700, Educational Structure and Change
EDUC 701, Human Development and Learning: Educational Psychology
EDUC 705, Alternative Perspectives on the Nature of Education

MATH/CS required courses
CS 410, Introduction to Scientific Programming
MATH 425-426, Calculus I and II
MATH 527, Differential Equations with Linear Algebra
MATH 528, Multidimensional Calculus
MATH 531, Mathematical Proof
MATH 644, Probability and Statistics for Applications; or MATH 735, Probability, and MATH 736, Statistics
MATH 645, Linear Algebra for Applications; or MATH 762, Linear Algebra
MATH 657, Geometry
MATH 698, Senior Seminar
MATH 761, Abstract Algebra
MATH 791, The Teaching of Mathematics, 7–12
Two additional approved MATH electives (usually taken from MATH 532, Discrete Mathematics; MATH 656, Introduction to Number Theory; MATH 658, Topics in Geometry; MATH 767, One-Dimensional Real Analysis; MATH 784, Topology)

Bachelor of Science: Interdisciplinary Programs in Mathematics and Its Applications

These programs prepare students for employment in areas of applied mathematics. Some of them also lead to graduate work in appropriate fields (e.g., physics, computer science, economics). The major may consist of mathematics combined with chemistry, computer science, economics, electrical science, fluid dynamics, mechanics, physics, statistics, or thermodynamics.

Each interdisciplinary major consists of ten mathematics courses plus at least five courses in the discipline of the option. Specific requirements follow. If more than five courses outside of mathematics are required or elected, the excess may be used to satisfy appropriate general education requirements.

Requirements

General education requirements (MATH 425 satisfies the requirement in Group 2, quantitative reasoning.)*

Other required courses
All options, except the computer science option, require CS 410, Introduction to Scientific Programming.

Required MATH courses
MATH 425-426, Calculus I and II
MATH 527, Differential Equations with Linear Algebra
MATH 528, Multidimensional Calculus (except in the computer science option)
MATH 531, Mathematical Proof
MATH 645, Linear Algebra for Applications; or MATH 762, Linear Algebra

Approved mathematics electives (must be chosen from MATH courses numbered 532 and above; in the statistics option these may include CS courses numbered 515 and above)
In the computer science option: MATH 644, Probability and Statistics for Applications (or MATH 735, Probability, and MATH 736, Statistics); MATH 532, Combinatorics; and three approved MATH electives
In the economics option: MATH 735, Probability; MATH 736, Statistics; and two approved MATH electives
In all other options except statistics: MATH 644, Probability and Statistics for Applications (or MATH 735, Probability, and MATH 736, Statistics); MATH 646, Analysis for Applications; MATH 647, Complex Analysis for Applications; and one approved MATH elective

Optional Courses

Chemistry Option
CHEM 405, General Chemistry (taken no later than sophomore year); CHEM 683 and 685, Physical Chemistry I and Physical Chemistry Laboratory (these two courses regarded as a single unit); CHEM 684 and 686, Physical Chemistry II and Physical Chemistry Laboratory (these two courses regarded as a single unit); CHEM 776, Physical Chemistry III; PHYS 701, Introduction to Quantum Mechanics I, or CHEM 774, Inorganic Chemistry
One free elective (note: CHEM 547-548, Organic Chemistry, suggested as elective for those planning to do graduate work in chemical physics)

Computer Science Option
CS 415-416, Introduction to Computer Science I and II
CS 515, Data Structures and Algorithms
CS 610, Operating System Fundamentals
Two more approved CS courses numbered 658 or above
Two additional courses: EE 543, Introduction to Digital Systems; and either EE 612, Computer Organization, or CS 611, Assembly Language Programming and Machine Organization

Economics Option
ECON 401, Principles of Economics (Macro)
ECON 402, Principles of Economics (Micro)
ECON 605, Intermediate Microeconomic Analysis
ECON 611, Intermediate Macroeconomic Analysis
DS 632, Operations Research
One approved course chosen from: ECON 626, Applied Regression Analysis; ECON 727, Advanced Econometrics; DS 633, Advanced Operations Research; DS 624, Time Series Forecasting; DS 625, Statistical Decision Making; DS 626, Applied Regression Analysis; DS 630, Quantitative Methods; DS 633, Advanced Operations Research; DS 672, Computer Systems Analysis and Design; DS 772, Decision-Support Systems

Electrical Science Option
EE 541, Electrical Circuits
EE 548, Circuits and Electronics
EE 603, Electromagnetic Fields and Waves
EE 645, Electrical Networks
EE 757, Fundamentals of Communication Systems
EE 771, Linear Systems and Control
(Note: EE 541 and 548 should be taken no later than the sophomore year)

Fluid Dynamics Option
ME 503, Thermodynamics
ME 608, Fluid Dynamics
ME 525, Mechanics I
ME 707, Analytical Fluid Dynamics
ME 708, Gas Dynamics

Mechanics Option
ME 503, Thermodynamics
ME 525, 526, 627, Mechanics I–III
Two additional ME courses chosen from: ME 723, Advanced Dynamics; ME 724, Vibration Theory and Applications; or ME 727, Advanced Mechanics of Solids

Physics Option
PHYS 407, 408, and 505, General Physics I–III
Three additional courses chosen from: PHYS 602, Thermal Physics; PHYS 607, Optics; PHYS 616, Physical Mechanics; PHYS 701, Introduction to Quantum Mechanics I; PHYS 702, Introduction to Quantum Mechanics II; PHYS 703, Electricity and Magnetism I; and PHYS 704, Electricity and Magnetism II)

Statistics Option
One MATH course chosen from: MATH 767, One-Dimensional Real Analysis; MATH 753, Numerical Methods and Computers; or MATH 754, Introduction to Scientific Computing
Five statistics courses: MATH 735, Probability; MATH 736, Statistics; MATH 739, Linear Statistical Models; MATH 742, Applied Statistical Methods; and MATH 740, Experimental Design

Thermodynamics Option

ME 503, Thermodynamics
ME 608, Fluid Dynamics
ME 525, Mechanics I
Two additional ME courses, chosen from ME 701, Macroscopic Thermodynamics; ME 702, Statistical Thermodynamics; and ME 603, Heat Transfer

Mechanical Engineering

(For descriptions of courses, see page 153.)

Mechanical engineering is a challenging profession encompassing research, design, development, and production of aerospace vehicles, underwater vessels, instrumentation and control systems, nuclear and conventional power plants, and consumer and industrial products in general. The profession also makes contributions through more fundamental studies of material behavior, the mechanics of solids and fluids, and energy transformation.

The mechanical engineering program develops the student's creative potential to meet the increasingly complex needs of industry, government, and education while giving an appreciation of the role of technology in a modern society.

The curriculum prepares prospective graduates either for more advanced studies or for beginning professional engineering careers. It provides a foundation of knowledge in the basic physical sciences, mechanics of solids and fluids, dynamic systems, thermal sciences, materials science, and design. Students develop abilities in analysis, experimentation, and design. Elective courses allow students to gain additional competence in any of these specific areas. Other elective courses in the arts, humanities, and the social sciences are included to provide a liberal education.

Students, with their advisers' assistance, should plan a program based on the following distribution of courses that totals not less than 128 credits. The outline that follows is to be considered as being typical only in format. Within the constraints of satisfying all of the requirements and having all the necessary prerequisites, schedules may vary because of scheduling needs or student preference. Some mechanical engineering elective courses may not be offered every year.

The curriculum has thirteen elective courses. These should be selected in consultation with a departmental adviser to lead to a balanced program that addresses chosen areas of interest. Five of the elective courses are selected from groups four through eight of the University's general education requirements, with the Group 7 general education course being either ECON 401 or RECO 411. One of the elective courses must be selected from the biological science listing of Group 3 of the general education requirements. Seven technical elective courses of at least 3 credits each are required. Three of the seven technical electives must come from the prescribed lists: A. engineering practice; B. mathematics; C. advanced engineering topics. These lists are available in the mechanical engineering office. One course must be taken from each list unless the student exercises the following option: A student may use these technical elective slots to access courses necessary to complete a minor, study in a foreign language, or complete a preprofessional program. Some programs may require additional elective courses to reach the minimum of 128 credits required for graduation. Other programs may exceed 128 credits to include all the required courses.

To enter the junior-year courses in the mechanical engineering major, students must have at least a 2.00 combined grade-point average for the following group of courses: PHYS 407-408, ME 503, ME 525, and ME 526.

In order to graduate in the mechanical engineering major, students must have at least a 2.00 grade-point average in all engineering and science courses, including technical electives normally taken as department requirements after the start of the junior year. The option of repeating required engineering, science, and technical elective courses normally taken after the start of the junior year may be exercised in only one of the following: (1) one course may be repeated twice; and (2) a maximum of two courses may be repeated once.

Freshman Year	Fall	Spring
ENGL 401, Freshman English	4	—
CHEM 405*, General Chemistry	4	—
MATH 425, 426, Calculus I and II	4	4
PHYS 407, General Physics I	—	4
ME 441, Engineering Graphics	—	4
CS 410F, Introduction to Scientific Programming	4	—
General education elective	—	4
	16	16

Sophomore Year		
MATH 527, Differential Equations with Linear Algebra	4	—
MATH 528, Multidimensional Calculus	—	4
ME 525, 526, Mechanics I and II	3	3
ME 503, Thermodynamics	—	3
EE 535, Circuits and Signals	—	4
PHYS 408, General Physics II	4	—
Technical elective**	3–4	—
General education elective	4	4
	18–19	18

Junior Year		
ME 608, Fluid Dynamics	3	—
ME 603, Heat Transfer	—	3
ME 627, Mechanics III	3	—
ME 643, Elements of Design	—	3
ME 646, Experimental Measurement and Data Analysis	—	3
ME 661, Introduction to Materials Science	4	—
ME 670, Systems Modeling, Simulation, and Control	—	4
Technical electives (2)**	3–4	3–4
General education elective	4	—
	17–18	17–18

Senior Year		
ME 705, Thermal System Analysis and Design	4	—
ME 755, Senior Design Project I	2	—
ME 756, Senior Design Experience	—	2
ME 747, Experimental Measurement and Modeling of Complex Systems	4	—
Technical electives (4)**	3–4	9–12
General education electives (2)**	4	4
	17–18	15–18

*CHEM 403-404 may be required for students whose preparation in chemistry is inadequate.
** See page 53 for degree requirements.

Energy Option

Many mechanical engineering graduates traditionally pursue professional careers in areas that are related to energy generation, conversion, or use. Increased emphasis on energy conservation and the development of alternative energy sources has created challenging and rewarding opportunities for graduates having a strong interest and capability in these fields. The Department of Mechanical Engineering offers a formal energy option intended to promote the development of well-planned student programs with special emphasis on courses applicable to ca-

reer goals in energy-related industries. This program of four courses, open to mechanical engineering majors, emphasizes those subjects necessary for an understanding of the engineering aspects of energy systems and related problem areas. Students electing the energy option should do so during the first semester of the junior year and have their program approved by a department faculty member involved in the option. To have the energy option shown on transcripts, students should file appropriate forms with the dean's office during the first semester of the junior year.

Required Courses

ME 708, Gas Dynamics
ME 710, Solar Heating Systems
CHE 705, Natural and Synthetic Fossil Fuels
CHE 712, Introduction to Nuclear Engineering

Physics

(For descriptions of courses, see page 170.)

Physics is concerned with the properties of matter and the laws that describe its behavior. It is an exact science based on precise measurement, and its objective is the kind of understanding that leads to the formulation of mathematical relationships between measured quantities. As a fundamental science, its discoveries and laws are basic to understanding in nearly all areas of science and technology. Advances in such diverse fields as medical instrumentation, solid state electronics, and space research have relied heavily on the application of basic physical laws and principles.

Students interested in the study of physics at the University of New Hampshire will find a strong interaction between research and academic programs. Undergraduates have participated in research studies ranging from nuclear scattering experiments at major particle accelerators to astrophysical studies of the solar system using space probes. These experiences have proven beneficial to engineering and physics students alike. The department has its own library, which provides a comfortable, inviting atmosphere for study and relaxed reading.

The suggested programs that follow are indicative of the flexibility available to students, whether they are preparing for graduate work in physics, industrial opportunities, governmental research, secondary-level teaching, or a general education that might utilize the fundamental knowledge of physics.

The following undergraduate degree programs are offered through the Department of Physics. Interested students may consult with the department chairperson.

Bachelor of Science in Physics

This degree is the professional program offered by the department. The required courses are those necessary for admission to graduate work or a career in industry. Additional courses may be beneficial for graduate preparation or may be desirable for more depth in certain areas of physics.

Requirements

1. Satisfy general education requirements.
2. Satisfy bachelor of science requirements (page 55).
3. One course in English is required in addition to the University requirement.
4. Minimum physics requirements: 407-408, 505, 508, 605, 615-616, 701, 702, 703, 704, 705; two courses selected from 707, 708, 710, 712, 718, 720.
5. Chemistry: 403-404 or 405.
6. Math: 425-426, 527, 528, 646 (optional); CS 410C or 410F.
7. By the end of the spring semester of the sophomore year, a student must have a minimum grade of C in each 400- or 500-level course specifically required for the B.S. degree and an overall average of 2.33 in these courses in order to continue in the B.S. program.

Physics electives

Additional physics courses may be selected from the following: 791, Special Topics; 795, Independent Study.

Suggested Curriculum for B.S. in Physics

Freshman Year	Fall	Spring
PHYS 407-408, General Physics I and II	4	4
MATH 425, 426, Calculus I and II (Group 2)	4	4
CHEM 403-404, General Chemistry (Group 3)	4	4
ENGL 401, Freshman English	—	4
Elective (general education requirement)	4	—
	16	16
Sophomore Year		
PHYS 505, General Physics III	4	—
PHYS 508, Thermodynamics and Statistical Mechanics	—	4
PHYS 615, Introduction to Mathematical Physics	—	4
MATH 527-528, Differential Equations with Multidimensional Calculus	4	4
CS 410F or 410C, Introduction to Scientific Programming	4	—
English (from Group 8)	—	4
Elective (general education requirement)	4	—
	16	16
Junior Year		
PHYS 605, Experimental Physics I	5	—
PHYS 616, Physical Mechanics	3	—
PHYS 701, Introduction to Quantum Mechanics I	—	4
MATH 646, Analysis for Applications (optional)	—	4
PHYS 703, Electricity and Magnetism I	—	4
Electives (general education requirements)	8	4
	16	16
Senior Year		
PHYS 702, Quantum Mechanics II	4	—
PHYS 704, Electricity and Magnetism II	4	—
PHYS 705, Experimental Physics III	4	—
Physics electives (must take two) (707, 708, 710, 712, 718, 720)	—	8
Elective (free)	4	8
	16	16

Bachelor of Arts, Physics Major

This degree provides an opportunity for a broad and liberal education, which in some cases may be sufficient for graduate work. A judicious choice of electives may also prepare students for interdisciplinary programs that require proficiency in a restricted area of physics.

Requirements

1. Satisfy general education requirements.
2. Satisfy bachelor of arts degree requirements (page 16).
3. PHYS 407-408, 505, 605, 615, 616, 701, 703, 705. Note that MATH 425, 426, and MATH 527, 528 are prerequisites for some of the courses. A total of 32 credits is required.

Bachelor of Arts, Chemistry and Physics Teaching

For information, see page 57.

School of Health and Human Services

Roger A. Ritvo, Dean
Beth Ely, Faculty Fellow for Student Affairs
Neil Vroman, Faculty Fellow for Academic Affairs
Carole A. Pierce, Advising Coordinator

Department of Communication Disorders
Department of Family Studies
Department of Health Management and Policy
Department of Medical Laboratory Science
Department of Nursing
Department of Occupational Therapy
Department of Physical Education
Department of Recreation Management and Policy
Department of Social Work

Bachelor of Science
Communication Disorders
Family and Consumer Studies
- Child and Family Studies
- Consumer Studies

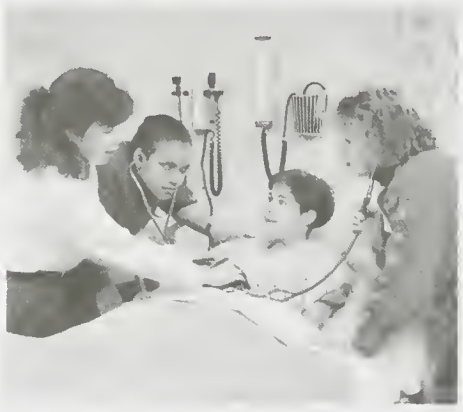
Health Management and Policy
Medical Laboratory Science
- Clinical Chemistry
- Clinical Hematology
- Clinical Immunohematology
- Clinical Microbiology

Nursing
Occupational Therapy
Physical Education
- Athletic Training
- Exercise Science
- Outdoor Education
- Pedagogy
- Sport Studies

Recreation Management and Policy
- Program Administration
- Therapeutic Recreation

Bachelor of Arts
Social Work

The School of Health and Human Services, established in 1968, was created in response to the growing need for programs in higher education that prepare young men and women for health-related careers. The school offers undergraduate instruction leading to the bachelor of science degree in communication disorders, family and consumer studies, health management and policy, medical laboratory science, nursing, occupational therapy, physical education, and recreation management and policy. During the summer of 1993, the school added social work to its programming, thus offering a bachelor of arts for the first time. Each program enables students to acquire the basic knowledge and skills needed to practice their chosen professions and to obtain a broad cultural background in the humanities and social sciences.



Degree Requirements

Candidates for the B.S. and B.A. degree must satisfy all general education requirements for graduation (page 14), earn at least 128 credits, successfully complete the courses required in one of the curricula described in this section, and achieve the required minimum grade-point average in the chosen curriculum. Generally, courses are to be completed in the sequence in which they are arranged.

Minors: See page 17; see also page 19.
Dual-Degree Programs: See page 16.
Student-Designed Majors: See page 85.
Second Majors: See page 17.

Undeclared Major

A limited number of well-qualified freshmen who have expressed an interest in a health-related career but who are undecided about a specific major may enter the School of Health and Human Services as undeclared students. Undeclared students should explore possible majors by selecting courses from those listed below.

Required Courses
ENGL 401, Freshman English
PSYC 401, Introduction to Psychology
ZOOL 507-508, Human Anatomy and Physiology

Recommended Courses
CHEM 403-404, General Chemistry
COMM 520, Survey of Communication Disorders
FS 455, Introduction to Consumer Studies
FS 525, Human Development
HMP 401, U.S. Health Care Systems
RMP 490, History and Philosophy of Leisure
RMP 501, Recreation Services for Individuals with Disabilities
NUTR 400, Introduction to Nutrition
NUTR 499, Introduction to Clinical Nutrition
PHED 500, Historical and Contemporary Issues in Physical Education
PHED 502, Basic Athletic Training
SW 524, Introduction to Social Work

All SHHS undeclared students are advised by a professional academic counselor. Upon declaration of a specific major, each student is assigned to a faculty adviser within the major department.

Undeclared students should be prepared to select a major by April when they preregister for the fall semester of the sophomore year.

Student Liability Insurance

All students whose programs require participation in clinical learning internships must purchase and maintain liability insurance for the entire clinical experience. The University has arranged for appropriate insurance cov-

erage at a modest cost to students. Further information may be obtained at major department offices.

Programs of Study

Communication Disorders

(For descriptions of courses, see page 116.)

Communication disorders is the profession devoted to helping people overcome disabilities of speech, language, or hearing. The study of communication disorders may begin in the freshman or sophomore year. Students learn about speech, language, and hearing disorders in the classroom and then become involved in clinical observation, in the on-campus clinic. Students are encouraged to take elective courses in linguistics, human development, learning theory, early childhood, health administration, special education, or various aspects of rehabilitation.

Students' professional education must be continued at colleges or universities offering graduate programs leading to a master's degree and to subsequent certification by the American Speech and Hearing Association. Certified clinicians find employment opportunities in hospitals, schools, community speech and hearing clinics, or private practice.

The required courses in communication disorders, which all students in the program must successfully complete, are COMM 520, Survey of Communication Disorders; 521, Anatomy and Physiology of the Speech and Hearing Mechanism; 522, The Acquisition of Language; 523, Clinic Observation; 524, Applied Phonetics; 630, Organic Pathologies; 631, Articulation and Language Disorders in Children; 634, Introduction to Clinical Procedures; 704, Basic Audiology; 705, Introduction to Auditory Perception and Aural Rehabilitation; and 777, Speech and Hearing Science. Students must also complete a course in statistics. Other elective courses are available. Students must have have a G.P.A. of 2.50 at the end of their sophomore year to continue in the major and must maintain a minimum G.P.A. of 2.50 thereafter.

Students interested in this program should consult with the chairperson, Frederick C. Lewis.

Family Studies

(For descriptions of courses, see page 134.)

The Department of Family Studies offers specialized programs of study for students desiring professional careers emphasizing family advocacy. Students may choose from five program concentrations (described below) under two broad options (child and family studies, consumer studies). Each concentration and option has entry-level criteria and unique course requirements. All require close consultation with a faculty adviser.

The child studies concentration is highly structured and has limited enrollment. Acceptance to this program and to the family internship is restricted to students demonstrating exceptional potential for working with children and families.

Core Courses

Core courses required of each family and consumer studies major are FS 525, Human Development; FS 555, Management and Decision Making; and FS 645, Family Relations.

A minimum of two 700-level courses in the student's concentration is required.

Twenty credits of supporting coursework are selected in consultation with the adviser. These courses must be 500 level or above and must include at least 12 credits in courses outside the department.

General Studies

Students desiring to work in settings providing services to children and/or families construct an individual plan of study in this concentration congruent with their specific professional goals.

Courses required for this concentration include 8 to 16 credits from the following: FS 623, Developmental Perspectives on Infancy and Early Childhood; FS 624, Developmental Perspectives on Adolescence and Early Adulthood; FS 635, Learning in Child Development Settings; FS 733, Supervising Programs for Young Children; FS 741, Marital and Family Therapy; and FS 743, Parents, Children, and Professionals. In addition, 8 to 16 credits are selected from the following: FS 455, Introduction to Consumer Studies; FS 553, Personal and Family Finance; FS 653, Consumer Problems; FS 654, Consumer Protection; FS 753, Family Economics; FS 754, Consumers in Society; and FS 794, Families and the Law.

Consumer Studies

Students desiring careers as consumer affairs professionals in business and governmental agencies should consult with their adviser to design an individualized plan of study in this option to meet their career objectives.

Course requirements include 24 credits selected from the following: FS 455, Introduction to Consumer Studies; FS 553, Personal and Family Finance; FS 653, Consumer Problems; FS 654, Consumer Protection; FS 664, Consumer Behavior; FS 753, Family Economics; FS 754, Consumers in Society; and FS 794, Families and the Law.

Consumer studies students interested in applying for the internship must take FS 664 and FS 753 as part of their concentration.

Child Studies

Young Child Students desiring a background in child development, for preparation for careers in early childhood settings, enroll in 24 credits of concentration courses from the following: FS 623, Developmental Perspectives on Infancy and Early Childhood; FS 635, Learning in Child Development Settings; FS 708 or 709, Child and Family Center Internship or Child Study and Development Center Internship; FS 733, Supervising Programs for Young Children; FS 734, Curriculum for Young Children; and FS 743, Parents, Children, and Professionals.

Nursery-Kindergarten Certification This certification has been approved by the New Hampshire State Board of Education to prepare students for certification as nursery-kindergarten teachers. Students must apply to the department for this competitive program by the spring semester of their junior year. Students enroll in five concentration courses: FS 623, Developmental Perspectives on Infancy and Early Childhood; FS 635, Learning in Child Development Settings; FS 733, Supervising Programs for Young Children; FS 734, Curriculum for Young Children; and FS 743, Parents, Children, and Professionals. Students also enroll in the following supporting courses: FS 708 or 709, Child Study and Development Center Practicums; THEA 520, Creative Drama; PHED 675, Motor Development; MATH 621, Number Systems for Teachers, or EDUC 741, Exploring Mathematics with Young Children; EDUC 706, In-

troduction to Reading Instruction in the Elementary Schools; EDUC 750, Introduction to Exceptionality, EDUC 751, Educating Exceptional Learners, or EDUC 760, Introduction to Young Children with Special Needs. An additional elective is selected in consultation with the adviser.

If accepted into the internship at the end of the junior year, students in their senior year enroll in FS 785, 786, Seminar for Student Teachers, and FS 788, Student Teaching of Young Children.

Family Relations

This concentration provides students with educational preparation to work in a community agency providing direct services to families. Students select 24 credits from the following: FS 623, Developmental Perspectives on Infancy and Early Childhood; FS 624, Developmental Perspectives on Adolescence and Early Adulthood; FS 635, Learning in Child Development Settings; FS 741, Marital and Family Therapy; FS 743, Parents, Children, and Professionals; FS 746, Human Sexuality; FS 794, Families and the Law. Students who anticipate applying for the family internship should enroll in FS 741 and FS 743 prior to submission of their application.

Family Internship

Internship students will apply knowledge gained from their academic studies in a supervised environment. Students apply for the internship during the fall semester of their senior year. Students must have completed most of their program coursework in family relations, consumer studies, or general studies prior to submission of their application. Accepted students will enroll in FS 782, Family Internship, and FS 792, Seminar for Family Interns. These last two courses will count toward the 20 credits required in supporting courses.

Home Economics Education

Students interested in certification for teaching home economics at the secondary level are encouraged to apply through the Department of Education for the fifth-year program. Undergraduate studies will follow the consumer program with courses in nutrition, clothing, and textiles to be included in the 20 credits of supporting courses.

Minor

The department offers a minor to interested students in related majors. Students desiring further information are advised to consult with the departmental administrative assistant as early as possible.

Health Management and Policy

(For descriptions of courses, see page 140.)

Undergraduates majoring in the health management and policy program are prepared to embark upon management careers in a wide range of health care delivery and financing organizations. Graduates work in many settings, including hospitals, nursing homes, health maintenance and other managed care organizations, public health departments, community-based and home health agencies, mental health facilities, regulatory bodies, and insurance companies.

The academic program is interdisciplinary, with undergraduates taking courses in many academic units of the University. Students gain a broad view of health and health care while developing analytical skills in health care management and policy. The department's computer laboratory is integrated throughout the curriculum.

The department's undergraduate program is an Approved Full Member of the Association of University Programs in Health Administration (AUPHA). Students majoring in HMP have the opportunity to become student members in the American College of Healthcare Executives and the American College of Health Care Administrators, both of which are represented by student chapters at the University.

Academic Program

Competencies are achieved through three components of the curriculum: University general education requirements, HMP collateral courses, and the HMP core courses (including a field practicum). Students work closely with their assigned faculty advisers to develop a plan of study to achieve completion of each of these components. Additionally, several upper-level HMP elective courses are available.

University General Education Requirements: Advisers assist students in selecting courses that satisfy certain program expectations and simultaneously meet University general education requirements.

HMP-Required Collateral Courses: A basic understanding is expected in each of the following five areas related to health management and policy: (1) microeconomics, (2) finite math or calculus, (3) organizational behavior, (4) accounting, and (5) statistics. HMP faculty advisers work with students to select the appropriate courses to fulfill these requirements. In general, students are advised to complete their collateral coursework prior to their junior year in the major. Program-approved courses in organizational behavior, accounting, and U.S. Health Care Systems (HMP 401) must have been completed successfully before a student may begin junior-level studies in the major.

HMP Core Courses: Each of the following courses must be completed by HMP majors prior to graduation. *Introductory courses* include HMP 401, U.S. Health Care Systems; and HMP 501, Epidemiology and Community Medicine. *Upper-division courses* include HMP 721, Managing Health Care Organizations; HMP 723, Health Planning; HMP 734, Health Law; HMP 740, Management Accounting for Health Care Organizations; HMP 741, Quantitative Methods for Health Care Organizations; HMP 742, Strategic Management for Health Care Organizations; HMP 743, Health Care Reimbursement; HMP 744, Ethical Issues in Health Management and Medicine; and HMP 746, Health Policy. Upper-division courses are not offered every semester and students generally progress through them in a sequential order.

Field Practicum: A full-time practicum (or administrative internship) that integrates classwork with supervised managerial work experience constitutes an essential part of the academic program. It allows students to explore an area of special interest in depth. Courses comprising this component of the major include: HMP 621, Prepracticum Seminar; and HMP 622, Field Practicum. The practicum is divided into three concurrent components: A. Field Practicum Organizational Analysis; B. Field Practicum Management Skills Development; and C. Field Practicum Project Analysis. Field practicum sites are selected by faculty with student involvement and

are concentrated in central and northern New England. Given sufficient timing of student request, efforts will be made to arrange practica at distant sites based on special needs.

HMP field practica occur during the summer between the junior and senior year in the major. They begin in late May and end in late August and require a full-time (i.e., 40 hours or more per week) commitment.

HMP Elective Courses: Upper-division elective courses within the program include: HMP 750, Comparative Health Care Systems; and HMP 755, Aging and Long-Term Care Policy. In addition, seniors may have the opportunity to elect independent studies (HMP 796) through individual arrangements with HMP faculty. Majors are encouraged to enroll in one or more of these courses before graduation.

Academic Requirements

HMP majors must obtain a minimum of a C– in all HMP core courses and must pass all HMP-required collateral courses. Majors must have an overall grade-point average of 2.50 by the end of the semester preceding their practicum. Students not maintaining an overall grade-point average of 2.50 are reevaluated by the faculty and may be counseled into another major area of study at the University.

The faculty reviews student performances during the semester before the practicum to determine each student's readiness. Students who do not successfully complete prerequisite courses may not be permitted to advance through subsequent courses in the major.

Applications for Major

Students interested in additional information about or in applying for admission to the health management and policy major are encouraged to contact the department office. Students seeking internal transfer into the major must complete an internal transfer application form and meet with a member of the faculty (usually the director of undergraduate studies). Efforts should be made to complete this process during the freshman year or early in the sophomore year to ensure sufficient time to complete all of the required collateral courses as well as those in the major in a timely and efficient manner.

Honors in Major

The department offers an Honors in Major program. To qualify, students must meet the department's requirement of having an overall 3.20 grade-point average at UNH and a 3.30 grade-point average for required HMP courses taken by the end of the junior year. Honors in Major students take honors courses during the senior year and complete an honors project in health care management or policy. Students work with a faculty member in the department in the development of the honors project. Students should contact the department's Honors in Major adviser for further information.

Academic Minor in Health Management

The department offers an integrated minor in health management designed for students majoring in clinically oriented professional programs offered through other departments in the School of Health and Human Services. Students not enrolled in the school who wish to minor in health management may inquire about doing so by contacting the department's director of undergraduate studies. Students accepted into the minor must complete (1) three required courses (HMP 401, U.S. Health Care Systems; HMP 721, Managing Health Care Organizations; and HMP 710, Financial Management for Clinicians); (2) one HMP elective course (HMP 501, Epidemiology and Community Medicine; HMP 734, Health Law; HMP 744, Ethical Issues in Health Management and Medicine; or HMP 755, Aging and Long-Term Care Policy); and (3) one additional elective course from a list approved by the department. Students seeking to minor in health management must complete the application available in the department office and meet with the department's director of undergraduate studies *before* commencing the minor.

Medical Laboratory Science

(For descriptions of courses, see page 155.)

Medical laboratory science is a challenging and rewarding profession for students interested in laboratory medicine. Medical laboratory scientists are vital members of the health team who perform various medical laboratory tests and provide the diagnostic assistance required in modern patient care. Medical laboratory scientists are employed in hospitals, research, industry, education, and a variety of other health care settings.

Students entering the program spend their freshman, sophomore, and junior years on campus. During their senior year, students may follow the generalist curriculum to become certified as a medical technologist, or choose to specialize in either hematology, microbiology, chemistry, or immunohematology. Students choosing the medical technology option will spend 26 weeks at Dartmouth-Hitchcock Medical Center in Lebanon, New Hampshire, or Beverly Hospital in Beverly, Massachusetts, where they complete clinical courses MLS 751–754. Upon successful completion of this program, which is accredited by the Committee on Allied Health Education and Accreditation, students are awarded a B.S. degree and are eligible to take the ASCP and NCA certification examinations.

Those students choosing to specialize in their senior year will spend 26 weeks at an area hospital completing an internship (MLS 761, 762, 763, or 764) as well as an Independent Study project (MLS 696). Upon successful completion, students are awarded a B.S. degree and are eligible to take the ASCP and NCA categorical examinations in their specialty area.

All students participating in clinical courses must purchase liability insurance and show evidence of selected immunizations.

Academic requirements are as follows: students must obtain a grade of C in all MLS courses. An overall grade-point average of 2.50 is required for those students following the medical technology option prior to the clinical experience. A personal interview at the clinical affiliation hospital is required for the medical technology and the specialty options. These interviews evaluate a student's understanding of the profession, communication skills, supervisory potential, maturity, and self-confidence. Students must demonstrate these attributes to participate in the clinical courses. A fee for liability insurance is charged when students are on their clinical affiliations.

Students interested in this program should consult the chairperson.

Career Mobility Option

This option is designed to make the B.S. degree in medical laboratory science

available to certified laboratory assistants, medical laboratory technicians, military-trained laboratory personnel, and other individuals with at least two years of full-time recent experience in the clinical laboratory. This may be done on a full- or part-time basis by taking prerequisite courses at UNH or other accredited institutions throughout the state. Students have the opportunity to challenge clinical course requirements through credit by examination. Written and practical examinations are available in the areas of chemistry, hematology, urinalysis, microbiology, immunohematology, and immunology. Students interested in the option should contact the chairperson of the medical laboratory science program.

Freshman Year	Fall	Spring
MLS 401, Introduction to Medical Laboratory Science	1	—
ZOOL 507-508, Human Anatomy and Physiology	4	4
CHEM 403-404, General Chemistry	4	4
ENGL 401, Freshman English	4	—
Electives (3)	4	8
	17	16
Sophomore Year		
CHEM 545-546, Organic Chemistry	5	—
MICR 503, General Microbiology	5	—
MICR 602, Pathogenic Microbiology	—	5
MLS 500, Introduction to Medical Laboratory Methods and Techniques	—	4
MLS 650A, Phlebotomy	—	1
HHS 540, Statistics for Health and Human Services Professionals	—	4
BCHM 658, General Biochemistry	—	3
BCHM 659, General Biochemistry Lab	—	2
DCE 491, Introduction to Computer Information Studies I	2	—
Electives (1)	4	—
	16	19
Junior Year		
MLS 652, Clinical Hematology	—	5
MLS 654, Clinical Chemistry	—	5
MLS 610, Laboratory Management	4	—
MLS 650B, Phlebotomy	1	—
MICR 705, Immunology	5	—
MLS 720, Clinical Mycology/ Parasitology	4	—
Electives (3)	4	8
	18	18
Senior Year (Medical Technology)		
MLS 655, Urinalysis and Body Fluids	2	—
MLS 653, Clinical Immunohematology	3	—
MLS 700, Toxicology	4	—
MLS 602, Medical Laboratory Seminars	2	—
MLS 751, Advanced Clinical Microbiology	—	5
MLS 752, Advanced Hematology	—	5
MLS 753, Advanced Immunohematology	—	5
MLS 754, Advanced Clinical Chemistry	—	5
Elective	4	—
	15	20

Senior Year (Specialty Students)
Students choosing to specialize take the courses listed above during the fall semester of their senior year. However, during the spring semester, all specialty students will register for MLS 696, Independent Study (4 credits), and either MLS 761, Clinical Microbiology Internship; MLS 762, Clinical Hematology Internship; MLS 763, Clinical Immunohematology Internship; or MLS 764, Clinical Chemistry Internship. The courses numbered MLS 761–764 are each worth 16 credits.

Nursing

(For descriptions of courses, see page 160.)

The nursing program reflects the mission and goals of the University and focuses on the uniqueness of each individual. The program is accredited by the National League for Nursing. Its goals are to help nursing students develop knowledge and skills essential to the present and future practice of nursing. Graduates of the program are prepared to provide care to individuals and groups, to help people identify and meet their health care needs, to be effective colleagues on the health care team, and to shape the future of health care.

The curriculum is divided into two areas: biological and social sciences as a foundation for courses in the major; and nursing courses, which emphasize caring, critical thinking, problem solving, decision making, and developing technical skills. Clinical experiences are offered in area hospitals and in community health agencies. The senior year culminates in a practicum which enables students to apply curriculum concepts to a clinical or functional area of their choice.

The faculty of the nursing program believe learning is a creative process wherein students are active participants in their education, growth, and development as professional nurses. Faculty members are facilitators and mentors to students within a supportive, scholarly environment.

Honors in major courses are offered to interested nursing students who have achieved a minimum cumulative grade-point average of 3.20.

The following prerequisite courses must be completed successfully prior to the first clinical course, NURS 514, Techniques of Clinical Nursing: ENGL 401, ZOOL 507-508, NUTR 400 and 499, PSYC 401, MICR 501, and NURS 501. FS 525 may be a pre- or corequisite to NURS 514. A course in statistics must be completed prior to or taken concurrent with NURS 645, Nursing Research. Prerequisite courses require grades C– or better and may not be repeated more than once to achieve successful completion.

Most of the prerequisite courses also meet general education requirements. A cumulative grade-point average of 2.00 must be attained prior to NURS 514 and maintained throughout the program. Major courses require a minimum grade of C.

Students are responsible for their own transportation to clinical agencies, uniforms, professional equipment, liability and health insurance coverage, and selected immunizations. Additional costs associated with the program include laboratory fees each semester beginning in sophomore year and fees associated with attendance at professional meetings. Students must be certified in cardiopulmonary resuscitation before the first clinical course and recertified as necessary until graduation.

Freshman Year	Fall	Spring
ZOOL 507-508, Human Anatomy and Physiology	4	4
NUTR 400, Introduction to Nutrition	3	—
NUTR 499, Introduction to Clinical Nutrition	2	—
ENGL 401, Freshman English	4	—
PSYC 401, Introduction to Psychology	—	4
Electives (3)	4	8
	17	16
Sophomore Year		
MICR 501, Public Health Microbiology	4	—
NURS 501, Introduction to Nursing	4	—

One course in statistics	4	—
FS 525, Human Development	—	4
NURS 502, Pathophysiology/ Pharmacology	—	4
NURS 508, Foundations of Nursing Judgment	—	4
NURS 514, Techniques of Clinical Nursing	—	4
Elective	4	—
	16	16
Junior Year		
NURS 611, Nurse-Client Encounter in Health Transitions	4	—
NURS 614, Nursing and Social Policy	—	4
NURS 615, Caring for Adults, *or* NURS 620, Caring for the Childbearing and Childrearing Family	6	—
NURS 645, Nursing Research	2	—
NURS 620, Caring for the Childbearing and Childrearing Family, *or* NURS 618, Caring for People with Alterations in Mental Health, *and* NURS 624, Nursing in the Community	—	6
	—	(3)
	—	(3)
Electives (3)	4	8
	16	18
Senior Year		
NURS 703, Nursing Leadership/ Management and the Organizational Context	4	—
NURS 615, Caring for Adults, *or* NURS 618, Caring for People with Alterations in Mental Health, *and* NURS 624, Nursing in the Community	6	—
	(3)	—
	(3)	—
Electives (2)	8	—
NURS 720, Professional Nursing Practice: Transitions	—	8
Elective	—	4
	18	12

R.N. Baccalaureate Program

Registered nurses with a valid New Hampshire license who meet University admission criteria may pursue on a full- or part-time basis a bachelor of science degree with a major in nursing at UNH in Durham or at Keene State College.

All students must successfully complete prerequisite courses before entering the nursing component. Curriculum requirements may be met through transfer credits, course enrollments, and challenge examinations.

The nursing component is based on the belief that R.N. students enter the program with knowledge and competence gained through previous educational and work experiences. This knowledge and competence can be demonstrated through completion of baccalaureate-level nursing theory and clinical examinations. Individualized plans of study are developed to enable completion of nursing content.

The R.N. student must earn a minimum of 128 credits and maintain a minimum UNH grade-point average of 2.00 for completion of the program.

Interested R.N.'s should consult with the R.N. program coordinator at Durham or Keene.

Occupational Therapy

(For descriptions of courses, see page 163.)

The curriculum is accredited by the Committee on Allied Health Education and Accreditation/American Medical Association in cooperation with the Accreditation Committee of the American Occupational Therapy Association. The program includes studies in three major areas: (1) liberal arts, sciences, and humanities; (2) biological, behavioral, and health sciences; and (3) occupational therapy theory and practice. Occupational therapy practice is directed toward enabling or restoring individual capacity for functional independence and adaptation in the context of clients' environments. Observation and guided practice in local clinical sites are an integral part of some courses.

Following completion of the four-year academic program, students are placed in three 3-month full-time fieldwork experiences. Successful completion of these three placements qualifies students to be awarded a B.S. degree and to sit for the Occupational Therapy Certification Examination administered by the American Occupational Therapy Certification Board.

Courses required for the major are listed below. This is a typical schedule for students entering the program in the first year.

To continue in the major students must maintain a minimum 2.33 cumulative grade-point average in required courses and earn a grade of C or better in designated courses. Specific requirements are delineated in the OT Department Policy and Procedure Manual which is distributed to all new students. Curriculum review and revision is undertaken annually; students are expected to check with their department advisers in September for updated policies and requirements. Students are responsible for transportation to off-campus clinical and other learning experiences and must purchase personal liability insurance for coverage for the clinical components of the curriculum.

First Year	Fall	Spring
ENGL 401, Freshman English	4	—
PSYC 401, Introduction to Psychology	4	—
OT 500, The Behavior and Development of Children	—	4
ZOOL 507-508, Human Anatomy and Physiology	4	4
OT 410, Introduction to Occupational Therapy	—	4
OT 441, Level I Fieldwork—Introduction	—	1
Elective	4	—
Any sociology course except SOC 502	—	4
	16	17
Sophomore Year		
OT 511, Introduction to Professional Literature and Communication	4	—
OT 514, The Meaning of Human Occupation	—	4
OT 501, Developmental Tasks of Adulthood	4	—
Any psychology course except PSYC 401 or 402	4	—
PHED 652, Clinical Kinesiology	—	3
PHED 653A, Musculoskeletal Assessment	—	1
OT 581, Concepts of Medicine and Health for Occupational Therapists	4	—
OT 641, Level I Fieldwork—Observation and Interpretation	—	1
Electives (2)	—	8
	16	17
Junior Year		
PHED 706, Neurology	4	—
OT 682A, Rehabilitation Principles for Occupational Therapists	—	3
OT 682B, Rehabilitation of the Upper Extremity	—	1
OT 683, Occupational Therapy: Psychiatric Foundations	4	—
OT 694, Neurodevelopmental Evaluation and Treatment	—	4
One statistics course (SOC 502, HHS 540, PSYC 402, RECO 701, RECO 528, or EDUC 785)	4	—
Electives	4	8
	16	16

Senior Year

OT 725, Occupational Therapy Treatment of Psychosocial Dysfunction	4	—
OT 733, Treatment in Adult Neurodysfunction	4	—
OT 734, Systems of Therapeutic Intervention in Physical Disabilities	—	4
OT 723, Group Process	2	—
OT 786, Management of Occupational Therapy Services	—	2
OT 788, Transitions: Student to Professional	—	2
Electives	6	8
	16	16

Level II Fieldwork Experiences

OT 797, Psychosocial Dysfunction Fieldwork
OT 798, Physical Dysfunction Fieldwork
OT 799, Special Area Fieldwork

Transfer applications are accepted for fall semester only. The deadline for application is March 1. Transfer students must enter the program with the following: (1) 64 credits and most general education requirements; (2) completion of the following courses: ENGL 401; PSYC 401; a second psychology course (excluding statistics, child and adult development, and abnormal psychology); a sociology course; and ZOOL 507-508. Prospective transfer students should consult the department for further information. The transfer student schedule is listed below.

Course Sequence for Transfer Students

First Year (Junior Year)

Fall
OT 410, Introduction to Occupational Therapy
OT 441, Level I Fieldwork—Introduction (1 credit)
OT 511, Introduction to Professional Literature and Communication
OT 581, Medical Concepts for Occupational Therapists
PHED 706, Neurology

Spring
OT 500, Behavior and Development of Children (if needed)
OT 514, The Meaning of Human Occupation
OT 641, Level I Fieldwork—Observation and Interpretation (1 credit)
OT 694, Neurodevelopmental Evaluation and Treatment
PHED 652, Clinical Kinesiology (3 credits)
PHED 653A, Musculoskeletal Assessment (1 credit)
Elective (if needed)

Summer
OT 682A, Rehabilitation Principles of Occupational Therapists (3 credits)
OT 682B, Rehabilitation of the Upper Extremity (1 credit)

Second Year (Senior Year)

Fall
OT 501, Developmental Tasks of Adulthood (if needed)
OT 683, Occupational Therapy: Psychiatric Foundations
OT 733, Treatment in Adult Neurodysfunction

Spring
OT 723, Group Process (2 credits)
OT 725, Occupational Therapy Treatment of Psychosocial Dysfunction
OT 734, Systems of Therapeutic Intervention in Physical Disabilities
OT 786, Management of Occupational Therapy Services (2 credits)
OT 788, Transition: Student to Professional (2 credits)

Third Year (Fieldwork carries no academic credit)

OT 797, Psychosocial Dysfunction Fieldwork
OT 798, Physical Dysfunction Fieldwork
OT 799, Special Area Fieldwork

Upon completion of the prerequisite courses, students are scheduled for a minimum of nine months of supervised clinical fieldwork placements. These Level II Fieldwork experiences are scheduled in centers that have established educational programs and are approved by the department. The fieldwork experiences are divided into three-month periods as follows: OT 797, Psychosocial Dysfunction; OT 798, Physical Dysfunction; OT 799, Special Area. A physical examination including a tuberculin test is required before fieldwork experiences. Proof of immunizations including poliomyelitis is also required. Students are required to purchase liability insurance and health insurance for their off-campus Level II Fieldwork experiences. Level II Fieldwork is the fifth year of preparation for entry to the field. A fee is charged for the coordination of fieldwork.

Eligible graduates apply for the July or January national certification examination. A fee is charged for the Occupational Therapy Certification Examination.

Students must be aware that curriculum revisions are continually considered; information will be available during new-student summer orientation and during the first week of classes.

Students interested in this program should consult the chairperson.

Physical Education

(For descriptions of courses, see page 166.)

Physical education is a dynamic profession, keeping pace with society's burgeoning passion for physical activity. The mission of the Department of Physical Education is to generate, transmit, and apply knowledge about the role of physical activity (including exercise, movement, outdoor adventure experiences, and sport) in the advancement of health in society. The department has several teaching, research, and service functions that support this mission, including the preparation of professionals in the five options described below. While options vary in emphasis, each curriculum offers students fundamental knowledge in the following areas: the biological, psychological, and sociocultural foundations and consequences of physical activity; the pedagogy and rehabilitative aspects of physical activity; and the management and marketing of delivery systems in the field. Each option makes extensive use of field experiences and internships that blend theory with practice.

The department offers five areas of study for majors: (1) athletic training; (2) exercise science; (3) outdoor education; (4) sport studies; and (5) physical education pedagogy. Students who wish to minor in physical education must complete 20 credits of coursework that have been approved by a department minor adviser. No more than 6 of the 20 credits may be earned through activity or coaching courses.

Students interested in majoring or minoring in physical education should consult with the specific option coordinator.

Athletic Training Option

An athletic trainer implements injury prevention programs and immediate treatment and rehabilitation procedures for injured individuals as directed by physicians. The National Athletic Trainers Association (NATA)-approved athletic training option pre-

pares professionals qualified to attend the athlete, the fitness-conscious jogger, or the skilled professional athlete.

Students take coursework in prevention, evaluation, management, care, and rehabilitation of athletic injuries as well as administration, education, and counseling. Students must earn a grade of B (3.00) or better in PHED 502 and a grade of C (2.00) or better in all other PHED required courses and ZOOL 507-508.

Students are also required to work in University training rooms as they earn clinical experience. Successful completion of the entire program, including 1,000 hours of supervised clinical experience, qualifies students to take the NATA Certification Exam. Students who wish to pursue both NATA certification and public school teacher certification should also see the pedagogy option. This double course of study will require between five and six years.

Students are admitted to the University in the athletic training option with conditional status. Specific criteria must be met during the student's first year before he or she attains full-time status in the option. It's very important that any interested students consult with option coordinator, Daniel Sedory, as soon as possible.

Required Courses	Credits
PHED 502, Basic Athletic Training	3
PHED 503B, Basic Athletic Training Lab	1
PHED 585, Emergency First Responder	3
PHED 620, Physiology of Exercise	4
PHED 622, Physical Conditioning	2
PHED 652, Clinical Kinesiology	3
PHED 653A, Musculoskeletal Assessment	1
PHED 658-659, Advanced Athletic Training	8
PHED 660, Therapeutic Exercise in Athletic Training	4
PHED 662, Therapeutic Modalities in Athletic Training	4
PHED 665, Laboratory Practicum in Athletic Training	
665A, Level I	2
665B, Level II	2
665C, Level III	2
665D, Level IV	2
665E, Level V	2
PHED 710, Athletic Training: Relevant Topics	4
PHED 715, Seminar in Athletic Training	2
PHED 780, Psychological Factors in Sport	4

University Required Courses

ANSC 400, Food and People	4
PSYC 401, Introduction to Psychology	4
Statistics Course	4
ZOOL 507-508, Human Anatomy and Physiology	8

Exercise Science Option

This curriculum prepares individuals for career opportunities in health promotion programs in hospitals, industry, and communities. Exercise scientists work in physical activity programs of prevention, intervention, and cardiac rehabilitation. Students with a particular interest in corporate health and fitness may wish to elect one or more of the following: ACFI 501, Survey of Basic Accounting; MGT 580, Introduction to Organizational Behavior; ECON 402, Principles of Economics (Micro). Students must earn a grade of C (2.00) or better in every required course. All required courses must be completed before enrolling in PHED 650. Interested students may consult with the option coordinator, Robert Kertzer.

Required Courses	Credits
PHED activities (452, 457)	2
PHED 502, Basic Athletic Training	3
PHED 503A, Basic Athletic Training Lab	1
PHED 585, Emergency First Responder	3
PHED 620, Physiology of Exercise	4
PHED 621, Exercise Laboratory Techniques	3
PHED 624, Physical Conditioning/ Exercise Leadership Practicum	2
PHED 650, Exercise Science Internship	8
PHED 652, Clinical Kinesiology	4
PHED 722, Graded Exercise Testing and Exercise Prescription	4
PHED 727, Introduction to Management of Physical Activity Programs	4
PHED 732, Electrocardiography	4
PHED 734, Advanced Exercise Leadership	4

University Required Courses

One course chosen from SOC 502, PSYC 402, or RECO 538	
CHEM 403-404, General Chemistry	8
CS 401, Computer Applications	4
NUTR 400, Introduction to Nutrition	3
NUTR 499, Introduction to Clinical Nutrition	2
PSYC 401, Introduction to Psychology	4
ZOOL 507-508, Human Anatomy and Physiology	8

Outdoor Education Option

The outdoor education option prepares individuals for careers working with diverse populations in public and private schools, organizations, and agencies. The techniques and approaches of adventure education represent the underlying philosophy of the curriculum. The option is interdisciplinary in scope, uses the various natural resources in the seacoast and mountain area, and gives students ample opportunity for practical application and field experience. Students must earn a grade of C (2.00) or better in every required course. Students seeking teacher certification should enroll in the pedagogy option and select additional appropriate courses in outdoor education. Interested students may consult with the option coordinator, Michael Gass.

Required Courses	Credits
PHED activities (540–549) Six outdoor education activities from recommended list (credits depend upon choices elected)	14–26
PHED 550, Outdoor Education Philosophy and Methods	4
PHED 681, Theory of Adventure Education	4
PHED 682, Outdoor Leadership (2 credits taken twice)	4
PHED 683, Organization and Administration of Outdoor Education	4
PHED 685, Emergency Medical Care: Principles and Practices	4
PHED 686, Wilderness Emergency Medical Care	3
PHED 693C, Teaching Assistantship in Outdoor Education	2
PHED 650, Internship in Outdoor Education	2–4

University Required Courses

ENGL 501, Introduction to Prose Writing	4
PSYC 401, Introduction to Psychology	4
Other: Core of courses emphasizing the particular area or population in outdoor education of interest to student —e.g., business, education, psychology—selected with assistance of an adviser	20

Sport Studies Option

Sport studies is an interdisciplinary field of study that provides a foundation for a variety of career paths, including sports writing or broadcasting; aspects of management or marketing in sport organizations; or further graduate study in areas such as sport law or sport psychology. Students take a core of courses in history, literature, sociology, and psychology of sport. Cognate courses may be in journalism, communication, administration, psychology, or in other approved areas.

Students must earn a grade of C (2.00) or better in each required PHED course. An internship experience or an independent study is required. An internship is strongly recommended since it is often critical to career development. Interested students may consult with the option coordinator, Stephen Hardy.

Required Courses	Credits
PHED 561, History of American Sport and Physical Culture	4
PHED 635, Sport in Literature	4
PHED 741, Sport in Society	4
PHED 780, Psychological Factors in Sport	4
Senior Seminar	

Electives

Sixteen credits approved by adviser to include PHED 650 or PHED 696. At least 8 credits above PHED 603; no more than 6 credits in activity/coaching courses.

University Required Courses	
PSYC 401, Introduction to Psychology	4
SOC 400, Introductory Sociology	4
CS 401, Computer Applications	4
One approved statistics course	4

Cognate Requirement

Students must select a second major, a minor, or a package of cognate courses approved by the faculty (minimum 20 credits). Suggested areas are administration, communication, economics, English, history, psychology, and sociology.

Physical Education Pedagogy Option

Pedagogy is the art and science of teaching. This option integrates a general education background with the theoretical and process knowledge involved in teaching movement-based elementary and secondary physical education programs. Extensive practicum experiences prepare students to teach preschool children, school-aged youth, and young adults, including students with developmental disabilities.

The pedagogy option provides the foundation for public school teacher certification through the Department of Education's fifth-year program. All fifth-year candidates must meet the requirements for admission to graduate school (e.g., grade-point average of 2.75 or above and 900 or above on the Graduate Record Examination) (see page 26). Students not seeking certification will find a bachelor's degree a solid basis for successful teaching or coaching in settings such as athletic or fitness clubs, YWCAs and YMCAs, boys' and girls' clubs, private schools, or resorts.

Interested students should consult with the option coordinator, Fran Cleland.

Required Courses	Credits
PHED 500, Historical and Contemporary Issues in Physical Education	4
PHED 501, Advanced First Aid & Emergency Care	2
PHED 504, Measurement & Evaluation in Physical Education	4
PHED 563, Secondary Physical Education Pedagogy	4
PHED 600, Movement Fundamentals	3
PHED 601, Lifetime Sports	3
PHED 602, Adventure Activities	3
PHED 603, Team Sports	3
PHED 604A, Rhythmic Forms I	1.5
PHED 604B, Rhythmic Forms II	1.5
PHED 606, Secondary Physical Education Practicum	2
PHED 608, Track and Field	1.5
PHED 609, Gymnastics	1.5
PHED 620, Physiology of Exercise	4
PHED 622, Physical Conditioning Exercise Leadership	2
PHED 624, Physical Conditioning & Exercise Leadership Practicum	2
PHED 652, Clinical Kinesiology	4
PHED 671, Motor Learning and Control	4
PHED 675, Motor Development	4
PHED 692, Elementary Physical Education Pedagogy	4
PHED 780, Psychological Factors in Sport	4
PHED 781, Special Physical Education Pedagogy	4
PHED 783, Developmental Physical Education Practicum	3

University Required Courses	
EDUC 500, Exploring Teaching	4
PSYC 401, Introduction to Psychology	4
ZOOL 507-508, Human Anatomy and Physiology	8

Recreation Management and Policy

(For descriptions of courses, see page 178.)

The Department of Recreation Management and Policy is nationally accredited by the National Recreation and Parks Association/American Association for Leisure and Recreation. The department's curriculum supports a broad-based liberal education and an opportunity to acquire specialized professional knowledge and skills. As the fabric of life in contemporary society grows in complexity, people are increasingly turning to leisure and the recreation services profession to find meaning, renewal, and enrichment in life. Recreation professionals work to enhance quality of life in diverse settings, including human services, health care, natural recreation resource areas, and commercial recreation businesses. Graduates are employed by communities, youth-serving agencies, conference centers, resorts, parks, hospitals, rehabilitation centers, and long-term care facilities. Population and economic projections suggest that recreation service industries will continue to expand and thereby continue to provide numerous professional career opportunities.

Curriculum Structure

Students entering the major may choose to either: (1) follow the program administration option, which includes the professional core and RMP electives combined with interdisciplinary courses to support career interests, or (2) pursue a specialized option in therapeutic recreation, which includes the professional core and required courses in therapeutic recreation.

International Study in Recreation and Leisure

A semester abroad sponsored by the American Universities International Program is available to students pursuing a degree in recreation management and policy. Programs in Scotland, Australia, or New Zealand provide discipline-related exchange opportunities. Approval by the curriculum director is required approximately one year before departure. Eleven transfer credits can be granted. Other destinations can be negotiated through the Office of International Affairs on campus.

Core Courses

All majors must complete a core curriculum of nine courses: RMP 490, History and Philosophy of Leisure; RMP 501, Recreation Services for Individuals with Disabilities; RMP 557, Recreation Services Program Design and Planning; RMP 558, Program Supervision and Leadership; RMP 654, Professional Development, Issues, and Ethics; RMP 663, Management and Policy in Leisure Services; RMP 664 (A or B), Professional Internship; RMP 724, Grantsmanship, Evaluation, and Research; and RMP 772, Law and Public Policy in Leisure Services.

A supervised internship (RMP 664) and an emphasis area of 18 to 20 credits are required of all majors. The internship is designed to bridge the gap between theory and practical application. Students working with their advisers and the internship coordinator select an appropriate setting based on their professional and career interests. They must complete a minimum of 480 hours of supervised field study within twelve weeks. Specific requirements are identified in the Internship Manual available from the Department of Recreation Management and Policy. The emphasis area supports a student's career goals and is designed by the student with approval from their academic adviser.

Program Administration Option

This program prepares students for supervisory or middle-management positions and emphasizes planning, marketing, and administrative concepts. Depending on the RMP electives and the career-support emphasis chosen, students may expect to find employment in settings such as conference and meeting planning, recreation resource management, business and entrepreneurial recreation, residential communities, municipal recreation, employee services recreation, and resorts.

In addition to the required core courses, students who pursue the program administration option must complete the following departmental requirements: two RMP course electives; CS 401, Computer Applications, or an approved equivalent; SOC 302, Statistics; PSYC 401, Introduction to Psychology; FS 525, Human Development; MKTG 350, Survey of Marketing; MGT 380, Organizational Behavior; and PHED 501, Advanced First Aid and Emergency Care, or equivalent certification.

Therapeutic Recreation Option

This option prepares students to work primarily in clinical, allied health facilities such as hospitals, rehabilitation centers, mental health centers, and extended care facilities focusing on therapeutic recreation services while achieving overall treatment goals. Observation and applied experience is a component of several courses. Students complete a 12- to 14-week full-time clinical internship under the supervision of a Certified Therapeutic Recreation Specialist (CTRS). Student must purchase personal liability insurance for coverage for the clinical components of the curriculum. The Bureau of Labor Statistics reports that therapeutic recreation is one of the fourteen fastest growing occupations in the country. The occupational outlook statistics reflect a "39% increase in demand for recreational therapists with strong clinical backgrounds" for the beginning of the twenty-first century. Upon successful completion of this option, students are prepared to meet sitting requirements for the National Council for Therapeutic Recreation Certification Examination.

In addition to the required core courses, students who choose this option must complete the following departmental requirements: RMP 502, Introduction to Therapeutic Recreation; RMP 603, Principles of Therapeutic Recreation; RMP 604, Clinical Aspects and Techniques in Therapeutic Recreation; RMP 606, Therapeutic Recreation Practices and Procedures; CS 401, Computer Applications, or approved equivalent; PSYC 401, Introduction to Psychology; PSYC 402, Statistics in Psychology; FS 525, Human Development; ZOOL 507-508, Human Anatomy and Physiology; PHED 652, Clinical Kinesiology; and PSYC 561, Abnormal Behavior.

Criteria for Admission and Retention

Internal transfer students must have a minimum 2.00 cumulative grade-point average and approval from an RMP faculty member for admission. Students within the major are required to maintain a minimum 2.50 semester grade-point average every semester to retain good academic standing within the major. In addition, student majors must obtain a grade of C (2.00) or better in RMP courses and a grade of C– (1.67) or better in all other courses specifically required by the department.

Social Work

(For descriptions of courses, see page 182.)

The social work major prepares graduates for professional entry-level social work practice within the context of a liberal arts education. It also prepares students for admission to graduate schools of social work and other graduate professional programs in human service professions. It is an accredited program, based on standards set by the national accreditation board—the Council on Social Work Education.

Social work majors pursue a program that deals with the origin, development, and organization of health and welfare institutions; methods of social work practice; and the relationship of the social work profession to contemporary social issues and problems. Social work majors gain direct experience and a better understanding of the field by a required field internship in a social welfare setting. The details of the field experience will be arranged between the student and the fieldwork coordinator. Students are required to pay a liability insurance fee for their off-campus fieldwork experience.

Social work majors are required to take ZOOL 401; SW 524, 525, 550, 551, 622, 623, 640, 640A, 641, 641A; and SOC 601. In addition, students are expected to take six designated distribution courses in several liberal arts disciplines. Many of these may also fulfill general education requirements. Students wishing to minor in social work are required to take any five courses offered by the department, excluding SW 640, 641. Students interested in either a major or minor in social work should consult with the chairperson in Murkland Hall.

Whittemore School of Business and Economics

Lyndon E. Goodridge, Dean
John Freear, Associate Dean
George T. Abraham, Director of Graduate and Executive Programs
Jo-Ann Kelly, Director of Undergraduate Programs
Gail Stepina, Academic Counselor

Department of Accounting and Finance
Department of Decision Sciences
Department of Economics
Department of Hotel Administration
Department of Management
Department of Marketing

Bachelor of Arts
Economics

Bachelor of Science
Business Administration
Hotel Administration

The Whittemore School of Business and Economics was established July 1, 1962, through the efforts of the late Laurence F. Whittemore, noted industrialist and long-time trustee and chairman (1955–60) of the UNH Board of Trustees. Since 1969, the school has been housed in McConnell Hall, named for Dr. John W. McConnell, the fourteenth president of the University (1963–71).

The mission of the Whittemore School of Business and Economics is to be a distinguished professional school in which the liberal arts are the basic foundation, and the management of change in a global economic community is the major emphasis.

In order to achieve this mission, the school is committed to the following goals:

1. The preservation of the unique disciplinary traditions in each of its departments and programs and the simultaneous commitment to broad educational excellence in critical thought, verbal and written communications, quantitative skills, computer literacy, and ethical reasoning.
2. The transmission, through excellent teaching, of basic and advanced education that prepares students for future careers in management, public service, research, and education, in which an understanding of business, economic, political, and social environments on both a national and global level are crucial requirements.
3. The production of prominent scholarship and research by its faculty.
4. The promotion of international awareness and cross-cultural understanding as an essential component of the educational experience of its students.
5. The integration of practice and theory in its educational process, the testing of its ideas in applied settings, and the guidance of its research by the acknowledged basic paradigms in its various disciplines.
6. The fostering of an environment that values collegiality, fairness, interdisciplinary activities, and continuous faculty development.
7. The encouragement of interaction with business and other external entities through such activities as research, consulting, executive development opportunities, mid-career learning programs, and other scholarly activities that contribute to lifelong learning.

The basic intent of the Whittemore School's undergraduate curricula is to combine a breadth of liberal education with specifics of professional education in business administration, economics, and hotel administration. Undergraduates enrolled in the Whittemore School programs must take a substantial part of their coursework in other colleges in the University in order to fulfill the general education requirements. Beyond those requirements, students are encouraged to elect additional courses in the arts, the behavioral and social sciences, the humanities, mathematics, and the natural sciences. Thus, students who complete the Whittemore School programs in business administration, economics, and hotel administration are prepared for employment and graduate study in both these and adjacent fields.

A minor is offered in business administration and in economics. Within the limits of its resources, the Whittemore School also intends to serve the needs of undergraduates elsewhere in the University for whom selected courses in business administration, economics, or hotel administration are desirable complements to their primary course of study. To the extent that space is available after majors have enrolled, some Whittemore School courses are open to nonmajors who have the prerequisite preparation.

Degree Requirements

The Whittemore School offers a bachelor of arts degree program in economics and bachelor of science degree programs in business administration and hotel administration. Course listings for business administration are found under accounting and finance (ACFI), business administration (ADMN), de-

cision sciences (DS), management (MGT), and marketing (MKTG). Candidates for a degree must satisfy all of the University general education requirements for graduation as well as the particular requirements of their individual major programs. In addition, candidates must complete a math course (400 level) and a computer applications course. Economics majors must also satisfy specific requirements associated with the bachelor of arts degree (see page 16). No Whittemore School course may be taken on a pass/fail basis by a student majoring in business administration, economics, or hotel administration.

Modifications tend to occur in major programs during the four-year period of a student's undergraduate career. Students are expected to conform to these changes. Students transferring into the Whittemore School from other universities must have business, economics, and hotel courses reviewed and approved by the Whittemore School Undergraduate Programs Office to be considered for major requirements.

For information concerning advanced degrees, see the Graduate School catalog.

A maximum of 32 credits in courses offered by the Whittemore School of Business and Economics may be taken by non-business students.

Advising System

Undergraduate advising in the Whittemore School is carried out jointly by academic advisers and the faculty. The academic advisers are based in the Whittemore School Undergraduate Programs Office, where student academic records are kept. The advisers assist students in program planning, preregistration, understanding and meeting general academic requirements, and general academic and career decision making. In addition, the advisers coordinate study abroad, domestic exchange and honors programs, as well as the Washington Internship Program. The faculty draw on their own experience, expertise, and interests in helping students with course, program, and career selection.

Undergraduates are encouraged to develop an advisory relationship with one or more faculty members with whom they have mutual interests. *All students are urged to seek as much assistance as they need, from whatever source, but are reminded that theirs is the ultimate responsibility for knowing and meeting the various academic requirements for a degree.*

Independent Study/Internship

Juniors or seniors in the Whittemore School may elect the internship or independent study options for variable credit. For either option, the student must secure a faculty sponsor in the area of interest and submit a written proposal prior to the start of the semester in which the project is to be undertaken. Independent study normally involves research, while internships are usually undertaken with cooperation of an off-campus organization and involve a nonroutine but practical application of skills and concepts acquired in a student's program.

Independent studies and internships require considerable self-direction and self-monitoring on the part of the student, who must be in high academic standing. Careful prior review of requirements with the undergraduate adviser is necessary. Students may earn no more than 16 credits in internships, independent studies, field experience, and supervised student teaching experience.

The Washington internship, a semester of supervised work experience in Washington, D.C., is open to any major. See page 181.

International and Exchange Programs

The Whittemore School encourages qualified students to participate in programs of international work and study. The Whittemore School has international exchanges including Grenoble, France, and Maastricht, the Netherlands.

Students may also elect to take a dual major in international affairs, offered in conjunction with the program for international perspectives (see page 83).

Information on all other international programs can be obtained from the sponsoring department or the Center for International Perspectives, Hood House, Room 204.

Five-Year Programs: B.A.-M.B.A., B.S.-M.B.A.

The Whittemore School and the College of Engineering and Physical Sciences offer a joint program leading to a bachelor of science (B.S.) in chemical engineering, civil engineering, electrical engineering, or mechanical engineering and a master of business administration (M.B.A.) in five years rather than the normal six. Similarly, with the College of Liberal Arts, the Whittemore School offers a joint program leading to a B.A. in French, philosophy, or psychology and an M.B.A. The College of Life Sciences and Agriculture and the Whittemore School offer a joint program leading to a B.S. in plant biology and an M.B.A. See the individual college descriptions for details. Very few students have been admitted to these programs. The programs are intended for students with strong academic competence, maturity, and work experience. Recent changes in the M.B.A. curriculum have reduced substantially the ability of students to complete the programs within five years.

Programs of Study

Accounting and Finance

(For descriptions of courses, see page 99.)

Accounting and finance are fundamental academic disciplines in business schools. Accounting provides the basic language of business and the underlying structure for information systems. Finance provides important knowledge about asset management, capital markets, and risk strategies.

Many professional career opportunities are open to students who elect an emphasis in accounting and finance. An accounting emphasis prepares them for jobs in certified public accounting, industrial accounting, and governmental service. This emphasis also allows students to sit for the Certified Public Accountant (CPA) exam and the Certified Management Accountant (CMA) exam. A financial emphasis prepares students for jobs in corporate financial management, investments management, banking, and governmental service. This emphasis allows students to sit for the Certified Financial Analyst (CFA) exam and the

Certified Financial Planner (CFP) exam. All of these career tracks are in segments of the economy that will expand in future years.

In addition to required core courses, students with a career emphasis in accounting can choose three to six courses from the following advanced courses: ACFI 721-722, Financial Accounting Theory and Applications I and II; ACFI 723, Advanced Cost Accounting; ACFI 724, Auditing; ACFI 725, Financial Statement Analysis; and ACFI 726, Business Taxation. Courses offering special topics in accounting and a variety of internships are also available.

Students with a career emphasis on finance can choose three to six courses from the following advanced courses: ACFI 701, Financial Policy; ACFI 702, Investments Analysis; and ACFI 703, International Financial Management. Courses offering special topics in finance (ACFI 640; ACFI 720), internships (ACFI 751) and independent studies (ACFI 753) are also available.

Students are also encouraged to develop a combined accounting and finance concentration with a course mix of their own choosing.

Business Administration

(For descriptions of courses, see Accounting and Finance, page 99; Business Administration, page 109; Decision Sciences, page 119; Management, page 149; and Marketing, page 150.)

The business administration program provides training for individuals interested in managerial or administrative careers in business or in public or private institutions.

Since most graduates of the program embark upon business careers, the program emphasis is in that direction. However, as demand has grown in recent years for people able to apply businesslike methods to the problems of not-for-profit institutions such as hospitals, school systems, government departments, and other socially oriented organizations, the program's objectives have been broadened to include all types of administration.

The curriculum offers professional education in the basic theories, principles, concepts, and analytical tools used by successful modern administrators, combining them with an introduction to some of the important functional areas of management. At the same time, typical students achieve a well-rounded education by selecting courses in the liberal arts and the sciences from other colleges and schools in the University.

The business administration program consists of thirteen required courses in three groupings, plus three required WSBE electives. In addition, the program requires completion of one semester of a 400-level math course and a computer applications course, which can be satisfied through coursework or acceptable equivalency. Group A includes the core courses taken in the freshman and sophomore years. These focus on basic concepts, tools, and skills. Group B consists of six courses in the functional areas of organizational behavior, operations management, marketing, finance, management information systems, and quantitative methods, normally taken in the junior and senior years. Group C consists of a course in business, government, and society; a "capstone" course in strategic management; and three electives. These electives must be chosen from upper-level (500 or above) Whittemore school courses. Credit/fail courses will not count as Group C electives. These are taken in the senior year.

Students must successfully complete all Group A courses (achieving a minimum grade-point average of 2.00 in them) and obtain junior standing before any Group B courses may be taken; and all Group B courses must be completed before taking required Group C courses. In order to graduate, students must achieve a grade-point average of at least 2.30 in the thirteen major courses and a minimum grade of C– in each major course. Transfer credit can be applied only to Group A courses.

Students are encouraged to take advanced electives in areas of their interest and in relation to career goals. Faculty and the undergraduate advisers can provide useful information and guidance for choices of electives.

The Whittemore School also offers courses for nonmajors. Students interested in these courses should contact the advising office.

The required plan of study is given below:

Freshman and Sophomore Years (Group A)

ECON 401, Principles of Economics (Macro); ECON 402, Principles of Economics (Micro); DS 420, Business Statistics; ACFI 502, Introductory Financial Accounting; ACFI 503, Managerial Accounting; CS 401, Computer Applications (or equivalent); MATH 420, Finite Mathematics, or MATH 424A, Calculus for Social Sciences

Junior and Senior Years (Group B)

ACFI 601, Financial Management; DS 670, Management Information Systems; DS 650, Operations Management; DS 630, Quantitative Methods; MGT 611, Behavior in Organizations; MKTG 651, Marketing

Senior Year (Group C)

MGT 701, Business, Government, and Society; MGT 703, Strategic Management: Decision Making; three WSBE electives

Minor

The Whittemore School faculty has developed a group of courses for nonmajors that, if available and when combined with certain elective courses, can constitute a minor in business administration. A list of minor requirements is available in the Whittemore School Undergraduate Programs Office, Room 120, McConnell Hall.

Decision Sciences

(For descriptions of courses, see page 119.)

The Department of Decision Sciences brings together faculty with special expertise in business statistics, decision support systems, management information systems, management science, production/operations management, operations research, and manufacturing strategy. The department contributes to the general education of all students in the Whittemore School through the development and teaching of required and elective courses. The department's faculty serve the school and the University through teaching excellence, active scholarship, and involvement with the business and professional community within the state and beyond.

Beyond the core courses students may elect any of three emphases within the department. For an operations management emphasis, students take DS 754, Production Planning and Control I; DS 755, Production Planning and Control II; and DS 758, Strategic Manage-

ment of Operations. These courses help prepare students to sit for the American Production and Inventory Control Society (APICS) certification exams. For a management science/statistics emphasis, students take DS 626, Applied Regression Analysis; DS 633, Advanced Operations Research; and choose from DS 522, Advanced Business Statistics; DS 624, Time Series Forecasting; and DS 625, Statistical Decision Making. For a management information systems emphasis, students take DS 672, Computer Systems Analysis and Design; and DS 772, Decision-Support Systems.

Students may also take DS 698 or DS 798, Topics in Decision Sciences, which has been approved for their emphasis.

Economics

(For descriptions of courses, see page 123.)

Economics is the study of how societies organize themselves to produce goods and services and to distribute those products among the members of society. In the modern world, a combination of market forces, public policies, and social customs perform these basic economic tasks. Economists use concepts, models, and data to analyze efficiency of resource use, fairness of economic outcomes, and development of global and national economies. The economics program is designed to introduce students to the tools of economic analysis and to show students how they can use those tools to analyze and better understand real-world situations.

Undergraduate training in economics is an excellent background for a variety of careers; these include banking and financial services, journalism, international business, public service, the diplomatic corps, entrepreneurial ventures, and government administration. An undergraduate major in economics is also excellent preparation for those interested in graduate work in law, business administration, and international relations.

Graduate work in economics can lead to careers in college teaching, research in public and private agencies, and business consulting. Those interested in studying economics at the graduate level should ask their economics professors what undergraduate coursework is appropriate and which graduate schools would be suitable.

Courses in economics are open to nonmajors on a space-available basis. Student majoring in other programs have found that certain economics courses are useful supplements to their own majors and a help in gaining employment. For example, political science majors can profit from studying public finance, economic development, international economics, and comparative economic systems. Mathematics and engineering students might elect to study regression analysis and intermediate microeconomics. Environmental conservation majors could choose to study ecological or energy economics. For more information on economics electives, please consult the Whittemore School Undergraduate Programs Office (McConnell 120) or the chairperson of the economics department.

Economics majors must complete eight courses in economics plus DS 420 with a grade of at least C– (1.67) in each course and an average grade of C or better. These courses must include ECON 605 and 611. In addition, majors must complete CS 401 and either MATH 420 or 424A. Coursework in accounting is recommended but not required.

Major credit toward ECON 605 and/or 611 will be awarded to transfer students only if equivalent courses have been taken at the junior level or above. Transfer students must take at least five of their economics courses at UNH.

Students may petition to substitute one business administration course for an economics elective if the course is at the 600 level or above and if a grade of C– or better is earned. Students may earn no more than 16 credits in internships, independent studies, field experience, and supervised student teaching experience. All economics majors must satisfy the bachelor of arts degree requirements (page 16).

A minor in economics consisting of five courses is available. At least three of these courses must be taken at UNH. In the near future, the economics department plans to introduce a number of specialized options within the economics major that will provide its graduates with even better career opportunities. For more on the minor and options within the major, consult the Whittemore School Undergraduate Programs Office.

A suggested plan of study for economics majors follows:

Freshman Year

ECON 401, 402, Principles of Economics (Macro and Micro); CS 401, Computer Applications (or equivalent); MATH 420 or MATH 424A

Sophomore Year

DS 420, Business Statistics; ECON 605, Intermediate Microeconomic Analysis; ECON 611, Intermediate Macroeconomic Analysis

Junior and Senior Years

Economics electives (at least 4)

Hotel Administration

(For descriptions of courses, see page 144.)

The program in the Department of Hotel Administration prepares students for management positions in the service sector and primarily in the hospitality industry. Graduates have accepted positions in lodging, food service, retirement facilities, tourism, travel and recreation industries, and institutions such as hospitals, nursing homes, colleges, and schools. The department seeks to place all graduates in the hospitality industry within three months of graduation.

In order to have a well-rounded university education, students take courses in liberal arts as well as foundation courses in business administration and economics. The hotel administration curriculum builds upon this foundation and provides experience and in-depth education in the lodging- and food service–related industries, as well as the broader industries that comprise the hospitality discipline. Each course includes an international component.

With our on-campus learning laboratory, the New England Center Hotel and Conference Center, the program includes a mix of practical experiences along with classroom activities. These practical experiences are provided by major consulting projects to industry as part of classroom projects, lecture series, seminars, and field trips; a minimum of 400 hours approved work experience or practicum; and by the operation of food service and lodging operations in the New England Center.

The Department of Hotel Administration encompasses fifteen required courses in three groupings. Group A consists of six core courses taken in the freshman and sophomore years. Group B includes most of the func-

tional business disciplines required to develop into a successful manager. Group C includes the majority of courses in the hotel administration major. A wide range of elective courses, independent studies, and internships can complement the required curriculum. In addition, the program requires completion of one semester of a 400-level math course and a computer application course, which can be satisfied through coursework or acceptable equivalency.

Students must successfully complete Group A courses, achieving a minimum grade-point average of at least 2.00, before Group B courses may be taken. With the exception of Food and Beverage Operations Management, Group B courses must be completed before taking any Group C courses.

To graduate, students must obtain a 2.30 grade-point average in all major required courses and a minimum grade of C– in each major course. Graduates of this program who are qualified for, and interested in further allied studies, are well prepared for advanced degree programs in business, institutional, or health administration. Students may earn no more than 16 total credits in internships, independent studies, field experience, and supervised student teaching experiences.

A required plan of study is given below:

Freshman Year

HOTL 401, Distinguished Lecture Series
HOTL 403, Intro. to Food and Beverage Management
ECON 401, Principles of Economics (Macro), or ECON 402
ENGL 401, Freshman English
MATH 420, Finite Mathematics, or 424A, Calculus for Social Sciences
Computer applications
4 University general education courses

Sophomore Year

DS 420, Business Statistics
ACFI 502, Introductory Financial Accounting
ECON 402, Principles of Economics (Micro), or ECON 401
HOTL 518, Managerial Accounting for the Hospitality Industry
3 University general education courses

Junior Year

HOTL 654, Lodging Operations Management
MGT 611, Behavior in Organizations
MKTG 651, Marketing
ACFI 601, Financial Management
HOTL 667, Food and Beverage Operations Management
DS 630, Quantitative Methods
DS 670, Management Information Systems
3 hotel, business, or University electives

Senior Year (Group C)

HOTL 655, Hotel and Restaurant Development
HOTL 700, Hospitality Marketing Management
HOTL 703, Strategic Management in the Hospitality Industry
5 hotel, business, or University electives

Management

(For descriptions of courses, see page 149.)

The study of management focuses on how businesses develop strategies and organizational forms to compete in national and global markets. Courses cover such topics as leadership skills, ethics, adaptation, innovation, organizational learning and change, human resource management, governmental regulation, and industrial economics. The department uses educational methods in teaching that promote behavioral competence through experiential learning and self-awareness, which provide analytical insight through empowering theoretical mastery and case analysis and that emphasize action through group projects.

In addition to the required core course (MGT 611, Behavior in Organizations) and the capstone senior-year courses (MGT 701, Business, Government, and Society; and MGT 703, Strategic Management), students may choose from a variety of electives including MGT 614, Organizational Analysis; MGT 647-648, Business Law I & II; MGT 712, Managing Organizational Change; MGT 713, Management Skills; MGT 714, Personal Values, Organizational Conflict, and Business Ethics; MGT 745, International Business; MGT 755, International Management; MGT 770, Human Resource Management; MGT 780, Issues for Men and Women as Managers; and MGT 785, Career Management. Courses offering special topics are also available.

Marketing

(For descriptions of courses, see page 150.)

The marketing curriculum is designed to help students explore the exchange process between a business or institution and its customers or memberships. A marketing exchange occurs when a person gives up something he or she values (e.g., money, time, or effort) for something he or she wants or needs from the business or institution (e.g., goods or services). Marketing is the function in the organization which is responsible for determining what those needs and wants are, how they might be met, and how to communicate with prospective customers about how the organization can meet their needs.

To this end, the department offers courses in marketing strategy, marketing research, advertising and promotion, selling and sales management, international marketing, and other special topics such as consumer behavior and the marketing of services. MKTG 651 is the introductory required course; the remaining courses are electives.

Careers for students interested in marketing include jobs in marketing management, sales, advertising, and marketing research. Opportunities exist in consumer and industrial products at all levels of the marketing channel from manufacturer to wholesaler to retailer; for goods as well as services; and within for-profit and not-for-profit organizations.

Special University Programs

Interdisciplinary Programs
Earth, Oceans, and Space
Gerontology
Health Promotion
Intercollege Courses
International Affairs
Marine Sciences
Student-Designed Majors
Technology, Society, and Values
War and Peace Studies

Preprofessional Programs
Prelaw
Premedical/Predental Study

Off-Campus Programs
Consortium (NHCUC) Student Exchange Program
UNH/UNHM Cross Registration
Foreign Study Programs

Exchange Programs within the U.S.

Other Programs
Honors Program
Reserve Officer Training Corps Programs
Undergraduate Research Opportunities Program

In addition to programs listed above, the following interdisciplinary programs may be found under their separate colleges and schools:

American studies minor, page 21
Biology, page 43
Community development, page 44
Dual degrees, page 16
Environmental conservation, page 45
Environmental engineering minor, page 54
Five-year B.A.–M.B.A. program, page 21, 29, 34, 35, 78
Five-year B.S.–M.B.A. program, page 40, 49, 78
General studies, page 47
Genetics minor, page 40
History and philosophy of science minor, page 22
Humanities major and minor, page 31
Hydrology, pages 54 and 59
Illumination and optical engineering minor, page 54
Independent study and projects in the College of Engineering and Physical Sciences, page 55
Interdisciplinary mathematics (9 options), page 62
Justice studies minor, page 23
Linguistics major, page 31
Materials science minor, page 55
Nutritional sciences, page 48
Plant pest management, page 40
Religious studies minor, page 23
Resource economics, page 49
Second majors, page 17
Soil science, page 50
Student-designed majors, page 85
Wildlife management, page 51
Women's studies minor, page 23

This section describes interdisciplinary study opportunities; preprofessional programs (prelaw, premed/predental); off-campus, foreign study, and exchange programs; and other special academic programs at UNH.

Interdisciplinary Programs

Earth, Oceans, and Space

The Institute for the Study of Earth, Oceans, and Space (EOS) is devoted to obtaining a scientific understanding of the entire Earth system and its environment in space. EOS research analyzes on global and finer scales the interactions and processes controlling the Earth system's components: the atmosphere, magnetosphere, biosphere (including anthrosphere), hydrosphere, cryosphere, lithosphere, the Sun, and the space environment.

The institute brings together under a common theme several established research groups on campus: the Space Science Center, the Biogeochemical Systems Center, the Glacier Research Group, the Complex Systems Research Center, and the Ocean Processes Analysis Laboratory. Although the primary educational theme of the institute is to expand upon existing graduate degree programs to train future scientists with a global view, undergraduate courses to stimulate and excite advanced students with the Earth system perspectives are offered.

Gerontology

The gerontology interdisciplinary minor provides students with the opportunity to examine and evaluate the aging process as it affects the individual and society. Through in-depth inquiry, personal encounters, and classroom discussion, students develop an understanding of aging from a variety of perspectives. Students are encouraged to analyze the historical and philosophical foundations from which policies, programs, and professional activities affecting the aged are developed, implemented, and evaluated.

Gerontology minors are required to take a minimum of 20 credits (five courses). The courses must include three core gerontology courses plus two electives from a list of courses approved by the Interdisciplinary Minor Advisory Committee.

Required Core Courses
GERO 600, Introduction to Gerontology
NURS 670, Issues in Health Care of the Aged
GERO 795, Independent Study (a practicum arranged by the coordinator of the minor, or by the appropriate designee)

Approved Electives
SW 525, Introduction to Social Welfare Policy
SW 550, Human Behavior and Social Environment I
SW 700, Social Gerontology
SW 701, Women and Aging
FS 525, Human Development
HMP 755, Aging and Long-Term Care Policy
NURS 535, Death and Dying
NUTR 760, Geriatric Nutrition
OT 501, Developmental Tasks of Adulthood
PHED 607, Biology of Aging
SOC 720, Current Developments in the Family: Aging and Late-Life Family
PSYC 582, Adult Development and Aging

Other courses on special topics may complete the electives if approval is obtained from the advisory committee.

Students who wish to minor in gerontology should consult with Elizabeth Crepeau, Department of Occupational Therapy, Hewitt Hall, (603) 862-2167. The director of the Interdisciplinary Program on Aging is Raelene Shippee-Rice, Department of Nursing, Hewitt Hall, (603) 862-4715.

Health Promotion

The health promotion minor introduces students to concepts of health and health promotion with a focus on personal life-style, community structure, economic structure, and social organization. The program relies on

such fields as health education, physical education, leisure management, sociology, psychology, epidemiology, public health, and community analysis. Thus, the minor is a valuable asset for students in various fields.

The health promotion minor consists of 20 credits of approved coursework, including three core courses and two electives from a list of approved courses. An advisory committee, chaired by a School of Health and Human Services faculty member, oversees the program. Students who wish to minor in health promotion should consult with Susan Frankel, director of the Center for Health Promotion, (603) 862-4599.

Required Core Courses

HMP 401, U.S. Health Care Systems
HHS 640, Environmental and Occupational Health
HHS 740, Health Promotion Seminar

Elective Courses

BIOL 420, Parasites and Pestilence
FS 746, Human Sexuality
GERO 600, Introduction to Gerontology
HMP 501, Epidemiology and Community Medicine
HMP 750, Comparative Health Care Systems
HMP 755, Aging and Long-Term Care Policy
MICR 501, Public Health Microbiology
NURS 595, Women's Health
NURS 670, Issues in Health Care of the Aged
NUTR 400, Introduction to Nutrition
NUTR 499, Introduction to Clinical Nutrition
PHIL 660, Law, Medicine, and Morals
PHED 723, Exercise Epidemiology

Intercollege Courses

Intercollege courses are listed on page 146. INCO courses include INCO 401, War; INCO 402, Peace; INCO 404, Honors: Freshman Seminar; INCO 480, Art in Society; INCO 585, 586, Foreign Exchange; INCO 604, Honors: Senior Thesis/Project; INCO 606, Internship; INCO 655-656, London Program; INCO 685, 686, Study Abroad; and INCO 698, Summer Research Project.

International Affairs

(For descriptions of courses, see page 147.)

The Center for International Perspectives offers undergraduate students the opportunity to pursue a dual major in international affairs. The dual major requires completion of the interdisciplinary international affairs program and any other major.

The purpose of the program is to expand students' global horizons, enhance their disciplinary major, and expand their career opportunities into the international arena. The requirements for international affairs are listed below.

Required Core Courses

IA 401, International Perspectives: Science, Business, and Politics
IA 501, Global Issues in International Affairs
IA 701, Seminar in International Affairs

Four Electives

(one from each of the program's four elective groups)
Foreign area
Science, technology, and the private sector
Public policy
Theory in international affairs

Competency in a Foreign Language

Functional reading, writing, and speaking ability equivalent to the third-year, second-semester level

Foreign Experience

A minimum of eight weeks in a non–English-speaking country

The courses in the dual major program are multidisciplinary, taught by faculty from many different departments in the University. They are designed to help students appreciate the complex interrelationships and interdependencies among nations and peoples and to equip students with the analytical skills and broad perspectives necessary for both public- and private-sector international careers.

Students who wish to declare international affairs must earn a *C or better in IA 401*, have declared (or be prepared to declare) a disciplinary major, and have a *2.50 cumulative grade-point average*. After declaration, students are expected to maintain at least a 2.50 grade-point average, which is the minimum required for study abroad at UNH.

IA 401, a prerequisite for IA 501, should be taken during the fall of the freshman or sophomore year, and IA 501 no later than spring of the sophomore year.

The foreign experience (usually completed during the junior year) and the foreign language requirement are completed before taking IA 701 in the spring of the senior year. To acquire the knowledge, skills, and experience that come from residence in a foreign culture, students may spend an academic year, semester, or summer in an academic institution, in an internship with a private or public organization, or in purposeful travel.

The completion of the dual major requires no additional credits for graduation beyond the 128 required of all UNH students. All coursework required for international affairs must be completed with a *grade of C or better*. For information, contact the Center for International Perspectives, Hood House, (603) 862-2398.

Marine Sciences

Undergraduate programs in marine science and ocean engineering at the University of New Hampshire reflect the diversity of the ocean itself and are enriched by easy access to a variety of natural laboratories, including estuaries, tidal rivers, coastal areas, and the open ocean.

Studies in marine science and ocean engineering draw from department faculties throughout the University. Students identify the discipline (ranging from mechanical engineering to zoology) they like best and pursue marine specializations related to that area of study.

Marine Program

The Marine Program provides a focus for marine activities on campus, with specialized laboratory facilities located in individual departments and organized research units. The Center for Marine Biology, the Center for Ocean Engineering, and the Center for Ocean Science—three of the Marine Program's major components—coordinate education and research activities in their disciplines.

Estuarine research is pursued at the Jackson Estuarine Laboratory on Great Bay, which is designated a National Estuarine Research Reserve. The Coastal Marine Laboratory, a major running-seawater facility, is located in nearby New Castle. Research on salmonids and other marine animals is conducted at the Anadromous Fish and Aquatic Invertebrate Research Laboratory, located near the Durham reservoir. The University's 50-foot research vessel has docking facilities at the Jackson Lab and at the State Fish Pier in Portsmouth Harbor. Summer finds

many students living and studying at the Shoals Marine Laboratory on Appledore Island, one of the Isles of Shoals, where UNH and Cornell University cooperatively offer undergraduate courses in marine sciences in a summer field laboratory setting. Each facility contains up-to-date specialized equipment, including navigational and sampling aids aboard the research vessel.

Curricula in the Marine Sciences

There is currently one undergraduate major in the marine sciences. The College of Life Sciences and Agriculture offers a major in biology with an option in marine and freshwater biology (see biology under COLSA). In addition, faculty in every school and college contribute to marine education. Students should declare a major in the established science discipline most closely allied to their principal area of interest and complete a minor in marine biology, ocean engineering, or oceanography. Students may declare only one marine minor.

Marine Biology

The minor in marine biology, available to all students in the University, consists of 20 credits with grades of C– or better and no pass/fail courses. No more than 8 major requirement credits may be used. All courses in the program are selected in consultation with a minor adviser in the Life Sciences and Agriculture Dean's Office, 201 Taylor Hall.

Students who want to minor in marine biology must take one introductory course (ESCI 501, Introduction to Oceanography; ZOOL/PBIO 503, Introduction to Marine Biology; or ZOOL 674, Field Marine Science) and four courses concentrating on an area of interest. For example, a student interested in marine mammals might take Mammalogy (ZOOL 712), Marine Invertebrate Evolution and Ecology (ZOOL 628), and Fisheries Biology (ZOOL 772). Courses commonly taken as part of the minor include PBIO 625, 721, 722, 725; CIE 747; MICR 714, 707; ZOOL/PBIO 503, ZOOL 628, ZOOL 674, ZOOL/PBIO 711, ZOOL 751, ZOOL 753, ZOOL 772, ZOOL 775. In addition, students are encouraged to become involved in a research project, either by working in a professor's laboratory or by participating in the Undergraduate Ocean Research Program (TECH 797).

Students should declare their intention to minor in marine biology before the end of the junior year. During the final term, students should apply to the dean to have the minor shown on their transcript.

Ocean Engineering

The ocean engineering minor allows undergraduate engineering students to acquire a nucleus of knowledge about engineering pertaining to the ocean and the coastal zone.

In addition to meeting the University minor requirement of 18 credits, students must complete satisfactorily a minimum of five courses from the following list: ESCI 501, Introduction to Oceanography; ESCI 752, Chemical Oceanography; ESCI 758, Introductory Physical Oceanography; ESCI 759, Geological Oceanography; OE 710, Ocean Measurements Lab; OE 753, Ocean Hydrodynamics; OE 754, Ocean Waves and Tides; OE 761, Materials in the Ocean; OE 781, Physical Instrumentation; OE 785, Underwater Acoustics; OE 795, Special Topics in Ocean Engineering; OE 751, Naval Architecture in Ocean Engineering; OE 752, Submersible Vehicle Systems Design; OE 757, Coastal Engineering and Processes; and TECH 797, Undergraduate Ocean Research Program. Ordinarily, students must take ESCI 501, TECH 797, and additional courses from the above list for a total of 18 credits. Two of these courses must be engineering courses.

Students wishing to take the ocean engineering minor should indicate their interest to the ocean engineering minor adviser, Kenneth C. Baldwin, Department of Mechanical Engineering, no later than the beginning of the junior year. During the final semester, students must apply to the dean to have the minor shown on their transcript.

Oceanography

The minor in oceanography, available to all students in the University, consists of a minimum of five courses totaling at least 18 credits with grades of C (2.00) or better and no pass/fail courses. No more than 8 major requirement credits may be used. All courses in the program are selected in consultation with the oceanography minor adviser, T. C. Loder, in the Department of Earth Sciences.

Required courses include (1) ESCI 501, Introduction to Oceanography; (2) two of the following courses: ESCI 750, Biological Oceanography; ESCI 752, Chemical Oceanography; ESCI 758, Introductory Physical Oceanography; ESCI 759, Geological Oceanography; (3) any two of the following courses, or a suitable substitute approved by the minor adviser (at least one of these courses should be in the biological sciences): PBIO 625, 722; CIE 747, 757; ESCI 754, 756; EOS 754; MICR 707; OE 751, 752, 753, 754, 757, 785; RECO 611; TECH 797; ZOOL 560, 674, 720, ZOOL/ESCI 750, 751, 753, 772, 775.

Students are encouraged to declare their intention to minor in oceanography before the end of the junior year. During the final semester, students should apply to the dean to have the minor shown on their transcript.

Shoals Marine Laboratory

The University of New Hampshire, in cooperation with Cornell University, offers a summer field program in marine sciences on Appledore Island of the Isles of Shoals. Courses introduce undergraduates to a broad array of marine sciences, including oceanography, marine biology, fisheries, and marine resources. Introduction to Field Marine Science (ZOOL 474), a three-week, 4-credit course, is offered each summer at the Shoals Marine Lab. It has no prerequisites and satisfies the general education requirement in the biological sciences. The four-week, 6-credit general course, Field Marine Science (ZOOL 674), is offered in June and August of each summer. It draws upon the backgrounds of more than fifteen faculty and many others, including captains, fishermen, and others whose living is associated with the sea. At least one full year of college biology or the equivalent is a prerequisite. Daily lectures and work in laboratory and field are offered; the course is graded on a letter grade basis. Other credit courses are offered in marine pollution, marine botany, adaptations of marine organisms, underwater research, and other areas. For further information, contact the Center for Marine Biology, Jackson Estuarine Laboratory, University of New Hampshire.

Diving Program

The UNH diving program offers instruction in scuba diving and research diving techniques. It provides professional diving support for underwater

research. The Shoals Marine Laboratory offers courses in marine archaeology and underwater research during the summer, under the guidelines of UNH diving regulations. For further information, contact Paul Lavoie, diving safety officer, through the Marine Program Office in the Marine Program Building.

Research

There are many opportunities for undergraduates to participate in marine research involving UNH faculty.

The University of New Hampshire and the University of Maine at Orono have a joint Sea Grant College Program that supports research, teaching, and service projects through funding from the National Oceanic and Atmospheric Administration of the Department of Commerce. Marine research projects also receive support through the National Science Foundation, the Department of the Interior, the Office of Naval Research, and other foundations and private donors.

Extensive research, interdisciplinary academic programs, and the extraordinary variety of marine environments and facilities allow students to observe and learn about the frontiers of science and technology being explored in the ocean. For further information about marine opportunities, contact the Marine Program Office in the Marine Program Building.

Student-Designed Majors

Under special circumstances, students may design their own majors. This option is offered for highly motivated and self-disciplined students who seek a course of study that is not available through existing programs at the University. It allows students, with the close supervision of faculty members, to cross department and college lines and to create educational experiences on and off campus as part of individual programs of study.

Student-designed majors are administered by a committee of elected faculty that operates through the Office of the Provost and Vice President for Academic Affairs. Students who want to design their own majors are expected to give the committee evidence of careful thought and planning in a detailed proposal submitted before the middle of their junior year. Proposal guidelines are available in the Office of the Provost and Vice President for Academic Affairs.

Technology, Society, and Values

The technology, society, and values (TSV) minor integrates studies of the nature of technology, its social and environmental impact, and its ethical implications. It allows students in technological majors to understand their disciplines in a broader context, and those in nontechnological majors to become better informed about technology and its effects.

The student minoring in TSV must complete a minimum of 20 credits of TSV courses. All students in the minor must take PHIL 424 (Science, Technology, and Society). TECH 583 (Technology: Cultural Aspects) is required of all non-engineering students. Other students, particularly those in the College of Engineering and Physical Sciences, may petition out of the TECH 583 requirement with the approval of the TSV adviser.

The remaining courses to constitute the minor must be selected, with the advice and approval of the TSV adviser, from the following list:

CHE 410, Survey of Current Energy and Pollution Control Technology
CIE 520, Environmental Pollution and Protection—A Global Context
CMN 455, Introduction to Mass Communication
EC 501, Environmental Philosophy
EC 635, Contemporary Conservation Issues
ECON 698, Special Topics: The International Transfer of Technology *or* Environmental Political Economy
ENGL 521, The Nature Writers
HMP 401, U.S. Health Care Systems
HIST 521, The Origins of Modern Science
HIST 522, Science in the Modern Period
INCO 401, War
NURS 670, Issues in Health Care of the Aged
PHIL 424, Science, Technology, and Society
PHIL 447, Computer Power and Human Reason
PHIL 630, Philosophy of the Natural Sciences
PHIL 660, Law, Medicine, and Morals
TECH 583, Technology: Cultural Aspects

The student may apply at most 4 credits within his or her major toward the TSV minor.

Students interested in minoring in TSV should contact the TSV adviser, Timm Triplett, 50A Hamilton Smith Hall, (603) 862-3080.

War and Peace Studies

War is the scourge of humankind. Tribes, cities, and nations have gone to war against each other for as long as we have record; only here and there, among some small "precivilized" groups, has war been absent or strictly controlled. For as long as we have record, too, we find thoughtful people crying out against war and pleading for peace, arguing for principles to govern war's conduct and laboring to mitigate war's effects, imagining a world where war is abolished, and taking steps to bring that world about. As the scale of war has grown to a size now great enough to devastate the entire globe in a single conflict, more and more people have devoted themselves to preventing war and finding acceptable substitutes. In the nuclear era, age-old moral and religious discussion has joined with historical study and practical, even technical, research to produce a set of related disciplines sometimes called "war and peace studies."

To meet the requirements for the war and peace studies minor, students must complete two core courses (8 credits) and 12 credits of elective courses with a grade of C– or better. At least one core course must be completed before any elective can be counted toward the minor. Ordinarily no two electives (or no more than 4 credits) may be taken from the same academic department. No elective may count for both a student's major and the war and peace minor. A relevant internship may be substituted for one of the electives. As they are announced, other relevant courses may be added to the list of acceptable electives. Students may request others not so listed. Courses carrying fewer than 4 credits will be counted as partial satisfaction of an elective requirement. If a good case can be made for it, a departure from any of these rules may be approved by the adviser for the minor and the coordinator.

All students will be assigned an adviser from the membership of the Committee on War and Peace Studies, ordinarily one not in the student's major department. The adviser will assist students in constructing a coherent program that suits their particular interests.

The core courses are INCO 401, War, and INCO 402, Peace. Occasionally a new core course may be devised.

Departmental elective courses will include the following:

AERO 681, National Security Forces in Contemporary American Society (3 credits)
CMN 456, Propaganda and Persuasion
EC 635, Contemporary Conservation Issues
HIST 520, The Vietnam War
HIST 537, Espionage and History
MILT 413, The Defense Establishment and Nation Security (1 credit)
MILT 502, American Military History (2 credits)
POLT 562, Strategy and National Security Policy
POLT 761, International Law
POLT 778, International Organization
RECO 506, Population, Food, and Resource Use in Developing Countries
SOC 780, Social Conflict

Special offerings that may serve as electives:
ANTH 797, Advanced Topics in Anthropology (e.g., War and Complex Society)
ECON 698, Topics in Economics (e.g., Economics of War and Peace)
ENGL 595, Literary Topics; ENGL 693, 694, Special Topics in Literature; ENGL 797, 798, Special Studies in Literature (e.g., Literature of World War I, Literature of the Vietnam War)
HIST 600, Advanced Explorations in History (e.g., Comparative Revolutions)
HUMA 695, e.g., Nonviolence, Thinking about War and Peace
INCO 404P, Understanding War
POLT 660, Special Topics in International Politics (e.g., Arms Control and Disarmament)

For more information, contact either Tony Nevin or Ken Fuld, Department of Psychology, or Michael Ferber, Department of English.

Preprofessional Programs

Prelaw

The Prelaw Committee of the University of New Hampshire recommends consideration of the following description of prelegal education.

Law schools are vitally concerned with the quality of preparation that students bring from their undergraduate experiences. For unless that preparation has been of high quality, the law schools cannot equip them for satisfactory performance within the legal profession and the democratic community.

The Prelaw Committee's responsibility in matters of prelegal education cannot best be met by prescribing certain courses and extracurricular activities for students planning to study law. The wide range of a lawyer's tasks opens a correspondingly wide range for choice in prelaw preparation. So-called law courses in undergraduate instruction should not be taken for the purpose of learning the "law." They are not likely to be effective as education for lawyers, although they can be very useful for teaching students "about law" and for helping them estimate whether they might be interested in law study.

But while it considers the prescription of particular courses unwise, the association can call attention to the quality of undergraduate instruction it believes fundamental to the later attainment of legal competence. That quality of education is concerned with the development in prelaw students of the following basic skills and insights.

Comprehension and Expression in Words

Language is the lawyer's working tool. He or she must be able, in the drafting of legal instruments, to convey meaning clearly and effectively. In oral and written advocacy he or she must be capable of communicating ideas convincingly and concisely. In reception no less than in expression, language is fundamental as the lawyer's medium of communication. For the lawyer must be able to grasp the exact meaning of factual statements and legal instruments, to catch the fine points of legal reasoning and argument, and to comprehend the technical materials that constitute the body of the law. To acquire sufficient capacity for communication requires extensive practice in all phases of the art. Truly, the legally trained man or woman must be precise in the use of the English language.

Critical Understanding of Human Institutions and Values

The purpose is to develop insight into, rather than merely information about, institutions and values: human nature and the physical world; the economic systems of societies; the democratic processes in western societies; the social structures of societies; the cultural heritage of western societies, including philosophy and ethics.

Creative Power in Thinking

The purpose is to develop power to think clearly, carefully, and independently. A large part of the work legally trained people are called upon to do calls for problem solving and sound judgment. Creative power in thinking requires the development of skills in research, fact-completeness, marshaling and differentiation of facts, deductive and inductive reasoning, reasoning by analogy, critical analysis, constructive synthesis, and power of decision.

For additional information, please contact a member of the Prelaw Committee: Richard Desrosiers, Classics, Murkland Hall, (603) 862-3132; William Jones, History, Horton Social Science Center, (603) 862-3025; John Kayser, Political Science, Horton Social Science Center, (603) 862-1699; or Ann Morgan, Recreation Management and Policy, Hewitt Hall, (603) 862-2391.

Premedical/Predental Study

Students preparing for careers in medicine, dentistry, optometry, osteopathy, podiatry, pharmacy, and physician assistant programs should become familiar with the minimum course requirements in their respective fields of interest as early as possible in order to incorporate the required courses into their college programs. There is no preprofessional major with a rigidly prescribed curriculum. Students are encouraged to major in subjects of their choice, either in sciences or nonsciences. In the past few years there has been a trend, particularly in premedicine and predentistry, away from exclusive concentration in a single area of science. Successful applicants from UNH have majored not only in sciences such as zoology, microbiology, biology, biochemistry, and chemistry but also English, history, languages, psychology, political science, and engineering as well as economics.

Students are assigned an appropriate faculty adviser from the department or school of their chosen major. The Premedical/Predental Advisory Committee offers information about specific admission requirements and procedures to the professional schools desired and provides recommendations at the time of application.

All medical and dental schools expect applicants to have demonstrated ability in basic natural and physical sciences. Although the specific requirements for admission vary considerably, the following courses constitute a *minimum* for students to be considered for admission: biological sciences, physics, gen-

eral chemistry, and organic chemistry—all two semesters each with laboratory. A year of English, preferably composition, is required, as are one or two semesters of calculus. An appropriate group of courses from among the offerings at the University of New Hampshire would be the following: BIOL 411-412; PHYS 401-402; CHEM 403-404 or 405-406, 651-652, 653-654; ENGL 401, 501; MATH 424B or MATH 425-426. One semester of general psychology is also required by some dental schools. In some instances substitutes will make acceptable alternatives. Contact the Premedical/Predental Advisory Office, 7 Hood House.

Courses that qualify individuals for consideration as premedical, predental, or other preprofessional students should be completed by the time application to a professional school is submitted, usually by the end of the junior year. Inasmuch as performance in these courses is weighted heavily by the admissions committees, it is strongly recommended that students not register for them under the pass/fail grading alternative.

The following schedule is suggested for timing applications to medical and dental schools:

1. Students should apply to schools of their choice in the summer after their junior year if they wish acceptance following graduation. However, a delay of a year or more to complete courses or to work is neither detrimental nor unusual for acceptance into medical or dental school. Though the application services accept applications from June through October/November, early applications are advantageous.

2. The Medical College Admission Test (MCAT) or the Dental Admission Test (DAT) must be taken before or at the time of application to medical or dental schools. The MCAT and DAT exams are preferably taken in the spring of the student's junior year (if the student is applying as a senior).

3. Interested students should contact the Premedical/Predental Advisory Office early in their college careers and meet members of the advisory committee before they apply to professional schools, since the letter of recommendation provided by the committee is an integral part of the admissions process. Visit the office or call (603) 862-3625 for an appointment.

Among students from UNH who were accepted into medical and dental schools over the past five years, the competitive overall grade-point average was approximately 3.50 for medical school and 3.20 for dental school.

Off-Campus Programs

Consortium (NHCUC) Student Exchange Program

Under the Student Exchange Program of the New Hampshire College and University Council (NHCUC), UNH students may be eligible to enroll for one or two courses, one semester of courses, or a full year of coursework at a member school, on a space-available basis. The consortium exchange allows matriculated undergraduates to use educational resources that are not available at the home campus and are considered appropriate for their degree programs. The consortium exchange will be used only when academic reasons or other special circumstances warrant it. Approval of the UNH adviser and college dean is required. Schools in the NHCUC consortium include Colby-Sawyer College, Daniel Webster College, Franklin Pierce College, Nathaniel Hawthorne College, New England College and its Arundel Branch in England (limited enrollment), New Hampshire College, Notre Dame College, Rivier College, St. Anselm College, UNH, Keene State College, and Plymouth State College. Students will remain as degree candidates and continue to pay normal UNH tuition and fees but must make their own room and board arrangements if they plan to spend a full semester at another consortium school. For more information and application forms, students should contact Carolyn Tacy in the National Student Exchange Office in Hood House.

UNH/UNHM Cross Registration

Matriculated students at the University of New Hampshire and the University of New Hampshire at Manchester may take UNH courses at either location. Students must have permission from their academic advisers and must register for the courses on a space-available basis. For more information and special registration forms, students should contact James Wolf, associate registrar, Stoke Hall, or Regina McCarthy, director of academic counseling, UNHM. See page 192 for UNHM course listings.

Foreign Study Programs

The University offers opportunities for full-time, degree candidates with a declared major, 32 credits, and minimum 2.50 grade-point average to study in many foreign institutions. Opportunities in Canada, England, France, German-speaking countries, Hungary, the Netherlands, Russia, and Spain are described below. Students may study abroad in other locations through approved non-UNH programs by using the intercollege option (INCO). All students who transfer credit from study abroad through non-UNH programs will be charged a transfer credit approval/transcripting fee. For information on study abroad programs, students should contact the Center for International Perspectives (Hood House) or the departments identified in the UNH program descriptions below.

New England/Quebec Student Exchange Program

Students may spend one or two semesters during their junior or senior year at one of eighteen French- or English-speaking universities in the province of Quebec. Eligibility requirements include a command of the language of the host campus, U.S. citizenship, and sophomore or junior standing. Contact the Center for International Perspectives, Hood House.

New England/Nova Scotia Student Exchange Program

Students may spend one or two semesters during their junior or senior year at one of eleven participating Nova Scotia institutions offering programs in the liberal arts, agriculture, business, engineering, art, and other fields. Eligibility requirements include U.S. citizenship and sophomore or junior standing. Contact the Center for International Perspectives, Hood House.

Cambridge Summer Program

For six weeks each summer, students from across the United States have the opportunity to participate in the Cambridge Summer Program held at Cambridge University in England. Program

participants take courses in English, history, or the humanities, taught by faculty from Cambridge University and UNH. Students live, dine, and study together at Gonville and Caius College, one of the oldest colleges at Cambridge. The program is open to students who have successfully completed at least one year of college. For more information, contact the director, Cambridge Program Office, 53 Hamilton Smith Hall.

London Program
At Regent's College in the heart of London, the University of New Hampshire sponsors courses in British studies, the arts, humanities, and a wide range of other basic subjects, offered during the fall and spring semesters. Taught by British and American faculty members, many of the courses are specifically concerned with British studies or have a special British emphasis. The program allows students to spend a semester or year in London while still making normal progress toward their U.S. degrees. To be eligible, students must have successfully completed at least one year of college and must have an overall grade-point average of at least 2.50. Interested students should contact the program coordinator, London Program Office, 53 Hamilton Smith Hall.

Summer French Language Program in Brest
Qualified students may take the equivalent of FREN 503 and/or 504, the UNH Intermediate French sequence, in Brest, a port city in the province of Brittany in western France and sister city of Portsmouth, New Hampshire. The courses are offered consecutively in two intensive four-week summer sessions on the Centre International d'Études des Langues (CIEL). Students live with local families and attend classes a total of 24 hours per week. Credit for courses completed successfully will be automatically transferred to UNH. For more information, contact Barbara Cooper, Department of French and Italian, Murkland Hall.

Junior Year Program in Dïjon
The Department of French and Italian sponsors a junior year abroad program at the University of Burgundy in Dïjon, France. Students live with French families in the heart of this historic city and take classes at the university with French students. Credit for all work completed successfully will be automatically transferred to UNH. The program is open to those who have completed FREN 631-632 and FREN 651-652 with a grade of B or better. For more information, see Jack Yeager, Department of French and Italian, Murkland Hall.

Business Administration Program in Grenoble
The New England State Universities offer a spring semester of study in international marketing at the University of Grenoble II. This is an opportunity for students interested in international business, economics, and trade to participate in an English-speaking program while gaining exposure to French culture. The semester will begin early in January with a one-week orientation and introduction to France, followed by two weeks of intensive French language. Students will be assessed and placed in the appropriate level. Students will be enrolled in four "core" courses: three taught by Grenoble faculty and one taught by the U.S. faculty member accompanying the group as resident director. The language of instruction is English. Students will earn 16 credits for the program. The program will continue until the end of May. During the semester there will be two one-week breaks and a one-week study trip.

Summer German Language Program in Berlin
Students with GERM 504 or beyond may obtain 4 to 8 credits taking GERM 625 or 625-626, a course focusing on improvement of language skills and exposure to the history and culture of contemporary Berlin. The course is taught by UNH staff; students are housed for three weeks at the Glienicke International Youth Center (IBJG) and for five days with Berlin families. The course is offered during late May and June (four weeks for 4 credits, eight weeks for 8 credits). Further information is available in the Department of German and Russian.

Programs in German-Speaking Countries
In addition to the UNH summer program in Berlin, students may study for a summer, a semester, or a full year through an approved American study abroad program or by applying directly to universities in Germany, Austria, or Switzerland. Study abroad plans should be discussed with an adviser as early as freshman year. Students must submit a Prior Approval Form after consultation with the major adviser and the study abroad adviser to establish possible UNH equivalents and fulfillment of major and/or general education requirements. To ensure proper credit transfer, students should keep syllabi, course descriptions, and all coursework to document their accomplishments abroad. American programs vary in size, quality, content, and cost. For credit in the German major or minor, the program must be conducted in German. Most programs require a minimum grade-point average of 3.00 and a B average in one's major. To study abroad in a program other than the UNH Berlin Seminar, German majors register for GERM 685 or 686 and nonmajors register for INCO 685 or 686.

Engineering and Physical Sciences Exchange Program in Budapest
The College of Engineering and Physical Sciences has arranged an opportunity for its students to spend the fall semester of their junior year at the Technical University of Budapest in Budapest, Hungary. Courses at the TUB are taught in English and receive prior approval for degree credit. Students studying at Budapest, therefore, will graduate on schedule at UNH. A general education course on the language, geography, and culture of Hungary, taken at the TUB, is required. The foreign student office at the TUB will appoint a Hungarian adviser for each student and will assist in obtaining housing either in dormitories, with private families, or in apartments. Further information is available from the college's associate dean and the college's foreign exchange program coordinator, A. Rucinski.

International Business and Economics Program in Maastricht
The New England Universities offer a fall semester of study in International Business and Economics at the University of Limburg in Maastricht. This program provides students who are interested in multinational business and economics the opportunity to par-

ticipate in an English-speaking European studies program. Students admitted to the program will earn 15 credits. The semester begins in late August with an orientation program and ends in mid-December. Participants will enroll in four or five 3-credit courses: three required courses and one or two electives. All instruction is in English. The University will consider applications from full-time undergraduate business and economics majors who have at least a 2.70 average and sixth- or seventh-semester standing by the fall of enrollment in the program. Other majors with a special interest in business and economics and exceptional fifth-semester students will be considered. Students must have completed at least the introductory courses in economics prior to the beginning of the program, and priority will be given to students who have also taken international trade or international finance. A transcript will be requested, as well as letters of recommendation from faculty members and others who know the student.

Programs in Russia

The UNH-sponsored program is designed for students who have completed RUSS 632 or equivalent with a grade of B or better and who have audited ENGL 715 or RUSS 791. It serves not only as a mechanism for improving language skills, but also for developing skills necessary for cross-cultural communication, where the audience is Russian and the topic is American English and current American culture and civilization. UNH students spend a semester in St. Petersburg, Russia, where they (1) take courses in Russian language and/or culture at an accredited Russian university, and (2) study foreign language and culture and civilization pedagogy with local methodologists and serve as interns in a local precollege, a higher education institution, or an adult education program.

In addition to the UNH-sponsored study abroad program in Russia, there are a number of approved study programs that provide the opportunities for students from UNH to earn college credits for spending a summer or a semester at an institution of higher learning in Russia. For further information about these approved programs, students should contact faculty members of the UNH Department of German and Russian in Murkland Hall (603-862-3522).

To receive credit for study abroad in Russia, students should register for RUSS 685 or 686.

Granada Program

The Granada program is administered jointly by the Spanish departments of the Universities of New Hampshire, Connecticut, and Rhode Island. Students may spend one or two semesters in a program designed for those who have completed SPAN 631 or its equivalent with a B average, have a grade-point average of 2.50, and have at least sophomore status. Courses taught by professors from the University of Granada fulfill requirements for the Spanish major and minor and general education requirements in humanities areas. Deadlines for fall applicants is March 1; for spring applicants, December 1. For further information, contact the Department of Spanish and Portuguese, Murkland Hall 209. (See also SPAN 685, 686 on page 185.)

Exchange Programs within the U.S.

The University offers many possibilities for exchange study with other American institutions. Exchange programs provide an educational experience in a different environment within the United States. It is hoped that students will develop new ways of viewing the country and expand their conception of our complex society.

A one-semester or full-year exchange program is available with the University of California, Santa Cruz. In addition, through the National Student Exchange, UNH students can study at more than one hundred colleges and universities throughout the country (including, but not limited to, North Carolina, New Mexico, Utah, Colorado, and the U.S. Virgin Islands and Puerto Rico).

To qualify for exchange study, students must be full-time degree candidates with at least a 2.50 grade-point average, be at least first-semester sophomores but no more than first-semester seniors, have declared a major, receive permission from their college dean and adviser, and receive permission from the exchange coordinator.

Students in exchange programs are expected to return to UNH to complete their studies. Participation in an exchange program does not disrupt the continuity of a student's educational process. Exchange program participants continue to maintain their status as UNH students, even while temporarily located at another university. Students thus do not have to withdraw from school and later be readmitted. Maintaining UNH student status also facilitates reentry into classes, dormitories, and many other dimensions of University life.

Interested students should contact Carolyn Tacy in the National Student Exchange Office in Hood House.

New England Subdegree Exchange Program

In order to provide students at the New England land-grant universities with expanded access to unique programs and faculty expertise, the institutions have agreed to encourage student exchanges of one but not more than two semesters. To qualify, students must identify a course or combination of courses related to their area of academic interest and not available on their home campus, be degree candidates in good standing with at least a 2.50 grade-point average, be at least first-semester sophomores, and receive permission from the appropriate university exchange authorities at both the sending and receiving institutions. Interested students should contact Carolyn Tacy in the National Student Exchange Office in Hood House.

Other Programs

Honors Program

The University of New Hampshire has a tradition of encouraging academic achievement through its twenty-one honorary societies, including active chapters of Phi Beta Kappa and Phi Kappa Phi. In 1984, the University took another step toward the recognition of outstanding students by establishing an undergraduate honors program. The University Honors Committee, made up of representatives from all colleges of the University, the Office of Admissions, the Division of Student Affairs,

and the Registrar's Office, supervises the operation and requirements of the program.

There are two ways to enter the University Honors Program:

1. The Office of Admissions identifies a number of qualified incoming freshmen who are then invited to submit an application to the honors program. The honors committee reviews these applications and determines admission to the program.

2. Freshmen who achieve a grade-point average of 3.20 or better during their first semester are also invited to join the program.

Participation in the University Honors Program does not add courses to those required to graduate. The first two years of the program focus on general education requirements. Students take a minimum of four honors-designated general education courses, one of which is an honors seminar based on a special topic. All students must attain a cumulative grade-point average of 3.20 by the end of their sophomore year in order to continue in the honors program.

The upperclass part of the honors program consists of honors work in the majors. A booklet describing these programs is available in department and college advising offices as well as in the Honors Program Office. Programs with "honors in major" work are animal sciences, anthropology, arts, biochemistry, business administration, chemistry, chemical engineering, civil engineering, classics, communication, communication disorders, computer science, earth sciences, economics, English, entomology, electrical and computer engineering, environmental conservation, family studies, forestry, French, geography, German, health management and policy, history, hotel administration, humanities, linguistics, mathematics, mechanical engineering, medical laboratory science, microbiology, music, nursing, occupational therapy, philosophy, physical education (exercise specialist option), physics, plant biology, political science, psychology, resource economics, Russian, social work, sociology, Spanish, theatre, and zoology. The University Honors Committee has developed a "University honors" option for students in majors that do not offer honors work. Contact the Honors Program Office for further information.

To satisfy honors program requirements, students must have a final cumulative grade-point average of 3.20. All courses used to achieve a University honors degree (with or without designation of major) or an honors in major degree must have a minimum grade of B–. Successful completion of University Honors Program requirements entitles the student to receive the designation "University honors" or "University honors in major" on his or her academic record and diploma. Completion of "honors in major" only is similarly denoted.

Full-tuition and partial-tuition merit-based scholarships are available to a select number of incoming freshmen. Several partial-tuition scholarships are also awarded to upperclass students. For more information, please contact Robert Mennel, director, University Honors Program, Hood House.

Reserve Officer Training Corps Programs

The Army and Air Force offer Reserve Officer Training Corps (ROTC) programs leading to a commission as a second lieutenant in their respective services. Both programs are open to men and women. Students in either ROTC program may pursue any University curriculum that leads to a baccalaureate or higher degree.

Two- and four-year programs are available. The four-year program is open to freshmen and to transfer students who began ROTC at another institution. In addition to on-campus ROTC course requirements, students must attend an officer preparatory training session for a part of one summer.

ROTC is open to all students pursuing a baccalaureate degree who have a minimum of two academic years or more remaining within their degree program. Entering freshmen may preregister for MILT 413 (AROTC) or AERO 415 (AFROTC). Sophomores desiring to enter ROTC should check with either the Army or Air Force enrollment advisers located in Zais Hall.

Two-year ROTC programs are open to students who have two academic years of study remaining at the University. Applicants for the two-year program must attend a six-week training session during the summer immediately before their entry into ROTC.

ROTC scholarships are offered on a competitive basis by both the Army and Air Force. Entering freshmen may compete for four-year scholarships during the last year of high school. Students in a four-year ROTC program and two-year program applicants compete for scholarships covering their remaining academic years. Scholarships pay for full tuition, all mandatory University fees, and required textbooks for all courses. Limits may be placed on these scholarships dependent upon the type and amount of expenses incurred. In addition, all scholarship recipients receive a tax-free $100-per-month subsistence allowance. Nonscholarship students in the last two years of a ROTC program also receive the tax-free $100-per-month subsistence allowance.

Students in Air Force ROTC are required to take a math reasoning course from a list approved by the professor of aerospace studies as part of their curriculum.

More specific information about ROTC programs may be obtained by contacting the professor of military science (Army ROTC) or the professor of aerospace studies (Air Force ROTC).

Undergraduate Research Opportunities Program (UROP)

Students can enhance their undergraduate education through collaborative research projects with faculty members. The Undergraduate Research Opportunities Program offers participants the chance to improve research skills and to acquire an understanding of the nature of research in an academic field. Participation in the program can also aid students in making choices and developing plans concerning careers and graduate schools. For information, please contact Donna Brown, director, UROP Office, Hood House.

Thompson School of Applied Science

Brian A. Giles, Director
Davis H. Burbank, Assistant Director
Emily J. Tousant, Admissions Coordinator

Applied Animal Science
- Dairy Management
- Equine Management
- Small Animal Care

Applied Business Management
- Business Computing
- Business Management

Civil Technology
- Architecture Technology
- Construction Management
- Surveying and Mapping

Food Service Management

Forest Technology
- Forest Technician
- Urban Tree Care

Horticultural Technology
- Floral Design
- Greenhouse Crop Production and Management
- Landscape Operations and Design
- Nursery and Garden Center Management
- General Horticulture

The Thompson School is a two-year school within the University offering the associate in applied science degree. A combination of science-based education, professional preparation, and practical experience qualifies graduates for employment as technicians, professional assistants, and supervisors in business and public organizations, or as small-business owners.

Facilities

The Thompson School of Applied Science is one of the few two-year schools in the country located on the campus of a major university. Thompson School students share residence and dining halls with UNH students and actively participate in University social life. They receive the same consideration for financial aid as all other UNH students, use the libraries and computer centers, and participate in the nearly one hundred clubs and organizations and in intramural and club sports.

The Thompson School, at the western end of campus, is a ten-minute walk from the center of campus. Barton Hall contains an animal science lab, a food preparation lab, a meat processing center, a biochemistry lab, several classrooms, and faculty offices. Cole Hall, the Thompson School headquarters, includes a 150-seat lecture auditorium, a quantity-foods kitchen, Stacey's (a specialty cafeteria), a study area, a business computer lab, a computer-aided design (CAD) lab, a thirty-seat seminar room, and administrative offices.

Nearby Putnam Hall houses a grooming area, an architecture lab, a surveying and mapping lab, an agricultural mechanization shop, classrooms, and faculty offices. Other facilities include the Dairy Bar (a restaurant and ice cream shop in a renovated railroad station), a sawmill, high- and low-temperature greenhouses, and a nursery plot. The Thompson School is also supplemented by many other University facilities including a new Dairy Center, a forty-one stall light horse barn, and a new Equine Science Center.

Admission

The Thompson School of Applied Science welcomes applications from both high school, transfer, and adult students who meet the admissions standards of the University of New Hampshire.

High school students who plan to enter the Thompson School after graduation will be considered on the basis of their high school course selection, academic achievement, class rank, and high school recommendations. Emphasis is placed on the applicant's personal motivation, demonstrated interest in a career field, and preparation for college-level studies. Adult students who have earned a high school diploma (or equivalent) will have both their academic record and their accomplishments since high school considered in the application process. Important factors include the student's professional work and advancement, personal and work-related level of responsibility, learning since high school, and motivation to succeed at college-level studies.

All students about to graduate from high school must submit the results of the Scholastic Aptitude Test (SAT). In addition, some Thompson School programs require specific high school preparatory courses. Applicants to the civil technology programs (architecture technology, construction management, and surveying and mapping) must present at least two years of sat-

isfactory work in college-preparatory mathematics. All applied animal science (dairy management, equine management, and small animal care) applicants must present at least one year of study in biological science. Students applying to forest technology (forest technician and urban tree care) are encouraged to present two years of college-preparatory mathematics.

Associate Degree Programs

The Thompson School of Applied Science offers the following professional programs:

Applied Animal Science

Applied animal science provides students with hands-on practical skills combined with knowledge and understanding of the latest technology. The core program provides a solid background in anatomy, physiology, nutrition, health, and animal breeding. In addition, students choose a specialization in either equine management, dairy management, or small animal care. Each specialization allows choices of elective courses in other areas as well.

Practical learning experience is provided at the UNH equine facilities and the new UNH Dairy Center, while the Thompson School also has its own grooming shop and biology laboratories. The curriculum has a number of animal-related educational programs, including cooperative arrangements with local humane shelters, a pet-assisted therapy program, and field trips to animal-related businesses.

Applied Business Management

The applied business management program combines classwork and practical experience to give students a thorough understanding of the business field. Along with a core curriculum of skills in accounting, human resource management, and communications, students choose to specialize in either business computing or business management. In the business computing area, students study database management, spreadsheet applications, and accounting with microcomputers. The business management specialization allows students to develop skills in accounting, economics, management, salesmanship, and business law. After their first semester, students may take up to three elective courses chosen from University course offerings.

Practical experience is gained through research projects with local industries, municipalities and state agencies, and student-run businesses. Students may also elect to take internships with area businesses.

Civil Technology

The civil technology program offers applicable skills through class instruction, extensive laboratory experience, and fieldwork. Students choose from one of the following specializations: architecture technology, construction management, and surveying and mapping.

Students gain practical experience by learning computer-assisted drawing in the Thompson School's CAD laboratory; in field surveying classes with the latest surveying equipment; and in laboratories in electricity, methods and materials, soils, and building construction.

Food Service Management

The food service management program is a carefully developed combination of classroom and laboratory work with opportunities for practical experience that provides students with the necessary skills for their chosen field.

Course topics include personnel management, food production, hospitality and function management, food and labor cost control, restaurant management, food and beverage accounting, purchasing, and sales. Students train in classrooms, in state-of-the-art food laboratories, and in the kitchens of two restaurants operated by the program. All students participate in the preparation of gourmet dinners, catered functions, and a work experience offered in cooperation with the New England Center—a restaurant, hotel, and convention center located on the UNH campus.

Forest Technology

The forest technology curriculum teaches a broad understanding of the forest environment and tree ecology as well as focusing on specific forestry skills. Students may elect to specialize and prepare for a career as a forest technician or may study in the field of urban tree care.

The forest technology program addresses the challenge of managing trees and forests to promote their conservation and wise use. The goal of forest management is to produce continuous crops of trees while keeping the timberland aesthetically pleasing and beneficial to wildlife.

The curriculum uses outdoor field study both on and off campus to complement classroom lectures. Small class sizes allow faculty members to work closely with students. Students in forest technology assist in the management of the University's 3,500 acres of forest land, harvest timber using professional logging equipment, and operate the University's sawmill as a lab for wood-product production. Students also spend two weeks touring northern New England and Quebec woodlands for an overview of northeastern forest management.

Horticultural Technology

The horticultural technology program provides a general horticultural background while also allowing students the opportunity to specialize. A broad set of foundation courses in the applied plant sciences leads to coursework in the following areas of specialization: floral design, greenhouse crop production and management, landscape operations and design, nursery and garden center management, and general horticulture.

Extensive laboratory periods, field trips, and field experience complement classroom lectures. Practical learning facilities include glass and plastic greenhouses, a lath area and container nursery, field nursery, and campus arboretum.

How to Apply

You may request a Thompson School catalog and an application for admission by mail or phone from either of the following offices: Thompson School of Applied Science, Cole Hall, 291 Mast Road, Durham, NH 03824-

3562 (603-862-1025); or UNH Office of Admissions, Grant House, 4 Garrison Avenue, Durham, NH 03824-3510 (603-862-1360).

Campus Visits

Prospective students are encouraged to take part in an interview, an open house, and tours of the Thompson School and the University of New Hampshire. To arrange your visit, please contact the Thompson School at (603) 862-1025.

Transfer Opportunities

The primary goal of most Thompson School students is to acquire the necessary knowledge, skills, and experience to enter employment in their field at the end of two years. However, many graduates elect to continue their education and earn a bachelor's degree.

Graduates with the associate in applied science degree may continue their education at UNH in a baccalaureate degree program. A grade-point average of at least a 2.50 at the end of two years is generally required for transfer consideration. Some UNH programs require a higher GPA to be admitted. Successful completion of a bachelor's degree will, in most cases, require two-and-a-half years of additional study at UNH. Thompson School students are encouraged to work closely with their adviser and professors to understand and prepare for transfer opportunities. Many other colleges and universities also welcome Thompson School graduates.

Expenses and Aid

Costs for in-state students averaged $10,589 in 1993–94 for tuition, room and board, required fees, books and supplies, and personal and travel expenses. Out-of-state students' costs averaged $18,219. For information about scholarships, loans, and work study, write Financial Aid Office, Stoke Hall, 11 Garrison Avenue, Durham, NH 03824-3511, or call (603) 862-3600.

University of New Hampshire at Manchester

John P. Resch, Interim Dean
Peter Haebler, Associate Dean
Elizabeth C. Lewis, Assistant Dean

Bachelor of Arts
Communication
English
History
Humanities
Political Science
Psychology

Bachelor of Science
Business Administration (WSBE)
Electrical Engineering Technology
Mechanical Engineering Technology
Sign Language Interpretation

Associate in Arts
General Studies
Studio Arts

Associate in Science
Biological Sciences
Business Administration

Credit Certificate Program
Sign Language Interpretation

The University of New Hampshire at Manchester was established in 1985 to increase access to a university education for people who live and work in central New Hampshire. The newest college of the University offers associate and selected bachelor's degrees, access to other UNH degree programs, special courses, workshops, seminars, and cultural events for the region.

Degree Programs

The University of New Hampshire at Manchester offers bachelor of arts degree programs in communication, English, history, humanities, political science, and psychology and bachelor of science degree programs in business administration, electrical engineering technology, mechanical engineering technology, and sign language interpretation. Students are required to satisfy University requirements, which include 128 credits, a 2.00 minimum cumulative grade-point average, general education requirements, and, for the bachelor of arts degree, a foreign language requirement. The foreign language is not required in the bachelor of science programs.

Students can also pursue UNH associate in arts or associate in science degree programs full or part time with a choice of concentrations. Requirements for the associate degrees include completion of 64 credits, a 2.00 minimum grade-point average, and an interdisciplinary core course. Those students who complete the last 16 credits of the associate degree with a grade-point average of at least 2.50, earn a cumulative associate degree grade-

point average of 2.50 or higher, and are recommended by their academic advisers are guaranteed admission to a baccalaureate program at the University in either Durham or Manchester. The University does not, however, guarantee admission to a specific college or program.

Selected graduate degrees from UNH and other colleges of the University System of New Hampshire are also available through the University of New Hampshire at Manchester.

Pre-Majors

Students entering the associate in arts program in general studies may prepare for transfer admission to many baccalaureate degree programs available through the University's Manchester and Durham campuses. By working closely with an academic adviser, general studies students can select structured course plans or pre-majors that are compatible with the following baccalaureate majors:

Biology
Communication
Communication Disorders
Ecology
Economics
Engineering
English
History
Humanities
Marine Biology
Physics
Political Science
Psychology
Sign Language Interpretation

Credit Certificate Program

The University of New Hampshire at Manchester offers a credit certificate program in sign language interpretation. This program is designed for individuals who want to add to their career or change careers to the field of sign language interpretation. This program is open only to those students who have completed at least a baccalaureate degree program and requires four years (eight semesters) to complete.

College Transition Program

The University of New Hampshire at Manchester's College Transition Program (CTP), formerly known as the Alternative Freshman Year (AFY) Program, enables students to begin their University studies as candidates for the associate in arts degree while receiving an intensive yearlong (two semesters) plan of academic support and study skill enhancement.

Students are identified as CTP eligible during the standard admission application review process and may enter the program during either the spring or fall semester. Typically, CTP students register for credit-bearing courses on a part-time basis. In some instances, CTP students may be required to supplement their academic schedules with noncredit coursework to strengthen writing or quantitative skills.

Attendance at New Student Orientation is required for CTP enrollment. After orientation, CTP students work closely with academic advisers to design appropriate course plans, establish performance goals, determine which learning support services are required, and monitor academic achievement.

Students who successfully complete two semesters of CTP may continue on to earn their associate degree through either full-time or part-time study.

UNHM Application Deadlines

The application deadline for the fall semester is June 15 and for the spring semester is November 1. For priority consideration for financial aid, the application deadline is May 1 for both fall and spring semesters.

For More Information

UNHM courses are listed on page 192 of this catalog. To receive a UNHM bulletin, catalog, or more specific information on UNHM courses and programs, contact the University of New Hampshire at Manchester, French Hall, 220 Hackett Hill Road, Manchester, NH 03102 (603-668-0700; TTY 603-622-4511).

Division of Continuing Education

William F. Murphy, Dean

The Division of Continuing Education provides access to higher education for New Hampshire residents under conditions that permit individuals to participate in University programs appropriate to their changing educational needs. These needs may at times be best satisfied through participation in workshops, seminars, short courses, or certificate programs—at other times by enrollment in credit courses and degree programs.

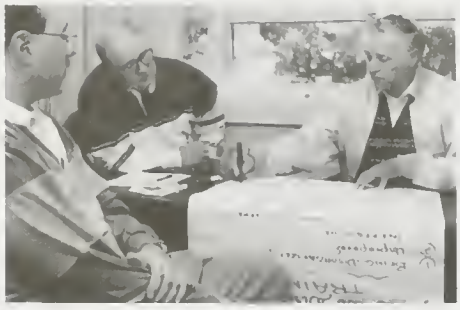
The Division of Continuing Education faculty is drawn from the teaching staffs of the University and from business, professional, and community leaders.

In addition to the programs listed below, it is possible to complete many of the degree requirements in other areas of study offered by the University through enrollment in credit courses scheduled by the Division of Continuing Education each semester.

Associate in Arts Degree

The associate in arts degree gives students an opportunity to obtain a general, two-year college education, elect coursework in several career-related fields, and in some instances earn college credits in supervised work experience with cooperating employers. The program is particularly suited to adults who are returning to the University after an interruption in their studies, who wish to be either full- or part-time degree students, and who need some time to establish their academic goals.

A wide range of University credit courses is available during both the daytime and the early evening hours. Special procedures have been designed to simplify admission and registration for part-time students.



Within the A.A. program, students have the opportunity to complete concentrations in a broad range of subjects offered by all of the schools and colleges or to take courses in several fields of study to explore a major, or they may elect to concentrate in computer information studies or pre-engineering and physical sciences. (For descriptions of courses, see page 120.)

The degree can be complete in itself or it can be a halfway mark toward a bachelor's degree. Credits earned as an A.A. degree candidate are transferable into related baccalaureate programs at UNH and other colleges and universities.

Admission Requirements

For the associate in arts degree program, candidates must have a high school diploma or an equivalency certificate and should have demonstrated ability and motivation through academic achievement, work experience, and/or military service. Associate in arts degree candidates are not guaranteed housing but are encouraged to contact the Department of Housing (603-862-2120) to explore possibilities.

Graduates of associate in arts programs are usually awarded a minimum of 64 credits upon entry into a UNH bachelor's degree program. Degree candidates wishing to continue their studies should consult with their advisers to ensure that their planned programs meet the specific requirements for the selected major at the institution awarding the bachelor's degree.

The associate in arts degree program is offered on a full-time and a part-time basis. Students interested in the part-time A.A. degree option should obtain an application form from the Division of Continuing Education. Students interested in a full-time A.A. degree program should obtain the application form from the UNH Admissions Office.

Degree Requirements

For degree requirements, see page 16.

Career Concentrations

Computer Information Studies

A career in computer information offers excellent opportunities for advancement and professional growth for individuals with appropriate training. Because computer information specialists are essential in today's technological, information-oriented society, qualified men and women will be in constant demand. Long-range employment forecasts predict solid, continuing growth well into the next decade.

This career concentration trains individuals for such entry-level positions as data analyst, applications technician, programmer, and computer operations supervisor. Graduates should be qualified to work on projects that involve equipment ranging from personal computers to large-scale hardware.

Required computer information studies courses: CS 412 or CS 406, CS 401 (or 495); DCE 492, 590, 591, and 592.

Pre-Engineering and Physical Sciences

Adults who desire a University degree in engineering or the physical sciences may enroll on a full- or part-time basis through the associate in arts degree program.

This program satisfies first-year course requirements of most B.S. programs in engineering and physical sciences. For further information, see separate Pre-Engineering Bulletin.

Required courses: MATH 425-426; PHYS 407-408; CHEM 403-404.

Academic Regulations and Pass/Fail

Associate in arts degree candidates are subject to the academic requirements established by the University for all students.

Associate in arts degree candidates, after completion of a minimum of 16

credits at UNH on a regular graded basis of A to F, may use the pass/fail grading alternative in a maximum of two elective 4-credit courses. The pass/fail grading alternative may be used for a maximum of 4 credits per semester. No pass/fail grading alternative may be used in fulfillment of University general education requirements or for courses in students' declared career concentrations. The minimum passing grade for credit is a D– (0.67).

Advising

Program planning and other advising services are provided by the professional staff of the Division of Continuing Education. Academic advisers are available from 8:00 A.M. to 4:30 P.M. daily and during evening hours on an appointment basis.

Financial Aid

Associate in arts degree candidates are eligible for the full range of financial aid offered by the University. See the Financial Aid section of this catalog.

Special Student Status

Special students—those who are not formally admitted into a degree program at the University of New Hampshire—may enroll in University credit courses each semester through the Division of Continuing Education.

All special undergraduate students are limited to 11 credits per term unless they obtain written permission from the dean of admissions, Grant House. Special graduate students are also subject to enrollment limitations. Contact the Division of Continuing Education for details.

Undergraduate Courses

Special students must have a high school diploma or its equivalent or be at least 18 years of age.

Graduate Courses

Special students must hold a bachelor's degree or equivalent from a regionally accredited college or university.

Prerequisites

All students are responsible for satisfying course prerequisites, if any. Instructors may require students to withdraw from a course if they are not adequately prepared for the level of work.

Academic Standards

A cumulative grade-point average of 2.00 (C grade) is the minimum acceptable level for undergraduate work in the University. The records of special undergraduate students are examined periodically; academically deficient or potentially deficient students may be warned, excluded, or suspended.

Noncredit Courses

Throughout the year, the Division of Continuing Education offers noncredit courses to the community. These courses provide opportunities for individual growth or continuing education for groups and individuals in business, labor, education, government, or the professions.

Professional and career development noncredit seminars and courses typically meet for one day or one evening a week for about ten weeks, depending on the learning objectives. Examples include paralegal studies, business management, information systems, graphic arts, skills for teaching, and human resource management.

Personal enrichment courses are offered during the day and evening, during the week, and on weekends. Examples include physical fitness and recreation, parent-child communication, arts and crafts, local history, current events, personal financial planning, creative writing, and photography.

Noncredit Certificate Programs

Certificate programs consist of specifically developed sequences of courses that provide a sound balance of theory, fundamentals, and specialized training. Certificates of achievement awarded by the Division of Continuing Education have earned professional acceptance as evidence of increased knowledge in basic principles and techniques.

Noncredit certificate programs include graphic arts, paralegal studies, computer applications, construction management, human resources management, and supervisory training.

Seminars and Conferences

The Division of Continuing Education also conducts conferences, institutes, workshops, and seminars, which range from half-day briefings on specific topics to residential programs lasting several days or weeks. Such programs are offered on topics of community interest and for the continuing education of business, industry, government, and the professions.

The Division of Continuing Education uses the facilities of the entire University campus for its programs, including the New England Center, extension centers at Nashua and Pease/Portsmouth, and nearby commercial establishments.

Course Charges

Students who enroll in credit courses through the Division of Continuing Education pay on a per-credit basis, depending on course level. These course charges are listed in the Division of Continuing Education Bulletin published before each semester. The course charges for noncredit courses and for conferences, workshops, and institutes vary according to the scope of the individual programs.

Class Schedule

While students may enroll in morning and afternoon classes through the Division of Continuing Education, many courses offered each semester are scheduled in the late afternoon and early evening to accommodate working adults.

All courses offered by the University each semester are open to special students on a space-available basis.

For More Information

For further information about programs or services, course offerings, registration procedures, and academic requirements, call or write the Division of Continuing Education, University of New Hampshire, Verrette House, 6 Garrison Avenue, Durham, NH 03824-3529, (603) 862-2015.

Graduate School

Karol A. LaCroix, Interim Dean
Harry J. Richards, Associate Dean

Master of Arts
Counseling
Economics
English
- Literature
- Language and Linguistics
- Writing

History
Music
Political Science
Psychology
Sociology
Spanish

Master of Science
Animal and Nutritional Sciences
Biochemistry
Biology
Chemical Engineering
Chemistry
Civil Engineering
Communication Disorders
Computer Science
Earth Sciences
- Geology
- Oceanography

Electrical Engineering
Entomology
Family and Consumer Studies
- Marriage and Family Therapy

Genetics
Hydrology
Mathematics
Mechanical Engineering
Microbiology
Music Education
Natural Resources
- Environmental Conservation
- Forestry
- Soil Science
- Water Resources
- Wildlife

Nursing
Ocean Engineering
Physical Education
Physics
Plant Biology
Resource Administration and Management
Resource Economics
Zoology

Master of Arts in Teaching
Elementary Education
Secondary Education

Master of Science for Teachers
Chemistry
English
Mathematics

Master of Education
Administration and Supervision
Counseling
Early Childhood Education
- Special Needs

The Graduate School offers a wide range of programs leading to the master's degree, one program leading to the C.A.G.S., and a number of programs leading to the Ph.D. degree. Graduate programs have been developed systematically to achieve academic excellence by careful utilization of institutional resources and regional opportunities. A highly qualified graduate faculty supervises programs and establishes the requirements for admission and degrees, which are administered by the dean of the Graduate School.

Elementary Education
Reading
Secondary Education
Special Education

Master of Occupational Education

Master of Business Administration

Master of Health Administration

Master of Public Administration

Certificate of Advanced Graduate Study
Educational Administration and Supervision

Doctor of Philosophy
Animal and Nutritional Sciences
Biochemistry
Chemistry
Computer Science
Earth Sciences
- Geology
- Oceanography

Economics
Education
Engineering
English
Genetics
History
Mathematics
Mathematics Education
Microbiology
Natural Resources
Physics
Plant Biology
Psychology
Reading/Writing Instruction
Sociology
Zoology

Admission

Persons holding a baccalaureate degree from an accredited college or university and wishing to take graduate-level courses at the University as part of a graduate degree program must apply for admission to the Graduate School. Admission to the Graduate School is both limited and competitive and is based solely upon academic qualifications and potential.

Applications for admission and the Graduate Catalog, containing detailed descriptions of graduate programs, may be obtained from the Graduate School, Thompson Hall, 105 Main Street, Durham, NH 03824-3547.

Early Admission—University of New Hampshire Seniors

Qualified senior students at the University of New Hampshire may be admitted to the Graduate School provided they have followed normal application procedures; they must have been admitted for the semester in which they wish to enroll in courses for graduate credit. A 3.20 cumulative grade-point average is normally required to be considered for early admission. Such seniors are normally admitted prior to the start of their last undergraduate semester. Seniors who have been admitted under early admission may register for a maximum of two courses for up to 8 graduate credits.

Dual Credit—UNH Seniors

University of New Hampshire seniors who have been admitted to the Graduate School under early admission may, upon recommendation of the department and approval of the Graduate School, be allowed a maximum of two graduate-level courses for up to 8 cred-

its toward both a bachelor's and master's degree. Dual credit forms must be completed and approved by the dean of the Graduate School at the beginning of the semester for which dual credit is sought. Dual credit forms are available at the Graduate School.

Admission to the 3/2 Program

Undergraduate UNH students may be admitted to one of the approved five-year combined bachelor's degree/master of business administration programs (see page 79), which normally commence during the fall semester of their senior year. Application to the Graduate School is made during the second semester of the junior year. Interested students should contact the Whittemore School for information.

Financial Assistance

Graduate assistantships are available in most departments. These involve part-time work in connection with the University's instructional or research activities. University awards, such as tuition scholarships, are also available to qualified students. Assistantships and scholarships are awarded on the basis of academic qualifications.

Financial assistance in the form of college work study and loans may be available through the Financial Aid Office.

Summer Session

William F. Murphy, Dean

The University of New Hampshire offers students the opportunity to continue their studies on a year-round basis through multiple sessions during the summer months. The summer courses are of the same high quality as those during the regular academic year and require the same level of academic performance.

Summer Session offerings include a broad range of undergraduate and graduate credit courses in most of the major academic disciplines. Throughout the summer, classes are scheduled in the morning, afternoon, and evening, as are special, intensive institutes.

Enrollment in Summer Session classes does not imply admission to degree candidacy.

Undergraduate Courses

Undergraduate courses are open to undergraduates from UNH and other colleges, to interested members of the community who have a high school diploma or its equivalent or who are at least 18 years of age, and to high school students completing their junior or senior year.

Graduate Courses

Graduate courses are open to UNH graduate students and other individuals with a bachelor's degree from a regionally accredited college or university or its equivalent from a foreign institution.

Other Offerings

Other Summer Session offerings include noncredit courses and certificate programs; workshops and seminars for business, industry, and the professions; and residential conferences and institutes.

For More Information

A separate summer bulletin is published each year in March and is available from Summer Session, University of New Hampshire, Verrette House, 6 Garrison Avenue, Durham, NH 03824-3529, (603) 862-2015.

Description of Courses

Explanation of Arrangement

The title and arabic number designate the particular course. When two course numbers are connected by a hyphen, the first semester of the course, or its equivalent, is a prerequisite to the second. If the course numbers are separated by a comma, qualified students may take the second semester without having had the first.

In courses that are not designated by title as laboratory courses, the notation "Lab" indicates that laboratory sessions are a part of the course.

All courses marked with an # have not been offered in the last three years.

Prerequisites and Corequisites

Each prerequisite for a course is separated from the other prerequisites by a semicolon; e.g., Prereq: EDUC 601; PSYC 635. If permission (of the instructor, department, adviser, or committee) is a prerequisite for all students, it is listed among the prerequisites (e.g., Prereq: EDUC 601; PSYC 635; permission). If, on the other hand, permission may be substituted for one or more of the listed prerequisites, it follows the other prerequisites and is separated from them by a slash mark (e.g., Prereq: EDUC 601; PSYC 635;/or permission). If permission may be substituted for only one of the prerequisite courses, it is listed with the course for which it may be substituted (e.g., Prereq: EDUC 601 or permission; PSYC 635).

Corequisites are courses that must be taken in the same semester.

Credits

The number of credits listed is the number of semester credits each course number will count toward graduation (except in the case of variable credit courses). Students must register for the number of credits shown or, if the course is variable credit, within the range of credits shown.

Cr/F following the description indicates that no letter grade is given but that the course is graded Credit or Fail.

For up-to-date information about when a course is offered; who teaches the course; the number of recitations, lectures, labs, and such, students are referred to each semester's *Time and Room Schedule.*

The system of numeric designation is as follows:

200–299	Courses in Thompson School of Applied Science.* Full credit only to TSAS degree candidates, who may transfer partial credit toward other associate and baccalaureate degrees.
300–399	Associate in arts /associate in science courses. Courses may be taken for credit only by associate's degree or non-degree students. Credits may not be applied to baccalaureate degrees.
400–499	Introductory courses not carrying prerequisites and courses generally falling within University and college requirements.
500–599	Intermediate-level courses for undergraduate credit only.
600–699	Advanced-level undergraduate courses. Entrance to courses numbered 600 and above normally requires junior standing.
700–799	Advanced-level undergraduate courses. Ordinarily not open to freshmen and sophomores.
800–999	Courses that carry graduate credit only and therefore are open only to admitted or special graduate students.

*See the TSAS bulletin. UNH baccalaureate nr associate in arts degree candidates may take 200-level courses for audit only, as the courses do not carry any graduationn credit.

Accounting and Finance (ACFI)

(For program description, see page 78.)

Chairperson: James O. Horrigan
Professors: Ahmad Etebari, John Freear, James O. Horrigan, Fred R. Kaen
Assistant Professors: Judith N. Bouley, Flora G. Guidry, Edward S. O'Neal, Patricia B. Smith
Virginia Paul Dee Assistant Professor: Catherine A. Craycraft
Lecturer: Naida Kaen

501. Survey of Basic Accounting
Overview of basic financial and managerial accounting concepts and procedures. Fundamentals for the preparation of financial statements and basic budgetary and cost control issues. For non-business administration majors and minors. (No credit for students who have had ACFI 502.) 4 cr.

502. Introductory Financial Accounting
Fundamentals of financial accounting concepts and procedures for analyzing economic events and the preparation of financial statements. (No credit for students who have had ACFI 501.) 4 cr.

503. Managerial Accounting
Planning, budgeting, and control within an organization. Emphasis on cost analysis in decision making. Prereq: ACFI 502. (No credit for students who have had HOTL 518.) 4 cr.

601. Financial Management
The investments, financing, and dividend decisions of the firm in a global setting. Topics include capital budgeting, designing and issuing securities, manager performance evaluation, resolution of agency problems, and working capital management. Prereq: WSBE majors only, all Group A courses, and junior standing. 4 cr.

620. Topics in Accounting I
Special topics; may be repeated. Prereq: ACFI 721 or 723 depending on topics and junior standing. 4 cr.

640. Topics in Finance I
Special topics; may be repeated. Prereq: ACFI 601 and junior standing. 4 cr.

701. Financial Policy
Development of analytical tools and practical skills for recognizing and solving complex problems of business finance. Working-capital management, capital budgeting, cost of capital, capital structure, and dividend policy. Prereq: ACFI 601. 4 cr.

702. Investments Analysis
Security valuation, efficient markets, portfolio management, options, and alternative investments. Computer research topics. Prereq: ACFI 601; permission. 4 cr.

703. International Financial Management
Financial management problems facing multinational firms. Primary focus on effects of currency denominations on financial decisions. Prereq: ACFI 601. 4 cr.

720. Topics in Finance II
Special topics. Prereq: ACFI 601 and senior standing. 4 cr.

721. Financial Accounting Theory and Applications—I
Review and application of traditional financial accounting theory and practical contemporary issues. Special emphasis on FASB authoritative pronouncements, cash flows, income measurement, asset valuation, and reporting practices. Prereq: all Group A courses. 4 cr.

722. Financial Accounting Theory and Applications—II
Special emphasis on such topics as revenue recognition, dilutive securities and earnings per share, pensions, leases, deferred income taxes, inflation accounting, partnerships, consolidations, fund accounting, and international accounting. Prereq: ACFI 721. 4 cr.

723. Advanced Cost Accounting
Effective use of cost accounting, cost analysis, and budgeting in planning and controlling operations. Analysis of cost behavior, activity-based costing, direct and absorption costing, cost-volume-profit analysis, overhead alloca-

tion, transfer pricing, and capital budgeting. Prereq: all Group B courses. 4 cr.

724. Auditing
Philosophy and environment of auditing, with special attention given to the nature and economic purpose of audits, standards, professional ethics, auditors' legal liability, internal control, and audit evidence. Analysis of audit concepts, procedures, objectives, reports, and computer software. Prereq: ACFI 721. 4 cr.

725. Financial Statement Analysis
The empirical properties of financial statement data and their power to predict security returns, corporate restructuring, debt ratings, and financial distress. An empirical research project using a computer database is required. Prereq: all Group B courses and senior standing. 4 cr.

726. Business Taxation
Taxation factors relevant to business decisions. Emphasis on federal income taxation from the viewpoint of the firm. Prereq: ACFI 601. 4 cr.

740. Topics in Accounting II
Special topics. Prereq: ACFI 721 or 723, depending on topics, and senior standing. 4 cr.

750. Internships in Accounting
Accounting fieldwork in a business or other type of organization. Supervision provided by the organization, and consultation provided by the faculty sponsor. Written report required. Course credits vary according to the nature of the fieldwork, to be determined by the faculty sponsor. Prereq: seniors in high standing; permission. 1–4 cr. Cr/F.

751. Internships in Finance
Finance fieldwork in a business or other type of organization. Supervision provided by the organization, and consultation provided by the faculty sponsor. Written report required. Course credits vary according to the nature of the fieldwork, to be determined by the faculty sponsor. Prereq: seniors in high standing; permission. 1–4 cr. Cr/F.

752. Independent Studies in Accounting
Student-designed individual research projects, approved by a faculty sponsor. Paper required. Course credits vary according to the nature of the project, to be determined by the faculty sponsor. Prereq: seniors in high standing; permission. 1–4 cr.

753. Independent Studies in Finance
Student-designed individual research projects, approved by a faculty sponsor. Paper required. Course credits vary according to the nature of the project, to be determined by the faculty sponsor. Prereq: seniors in high standing; permission. 1–4 cr.

754. Honors Seminar in Accounting and Finance
Seminar discussions of advanced readings in accounting and finance. For seniors with standing in the honors program. 4 cr.

Adult and Occupational Education (AOE)

Department of Resource Economics and Development
(For program description, see page 40.)

Coordinator: David L. Howell
Professors: William H. Annis, David L. Howell
Associate Professor: Lewis Roberts, Jr.
Adjunct Associate Professor: Peter J. Horne
Thompson School Associate Professor: Thomas A. March
Assistant Professor: Patricia Dugan-Bedker

440. Concepts of Career Exploration
Examines the four major roles of people (as family members, students, workers, and users of leisure time) and how these roles apply to (1) achieving a balanced life; (2) exploring individual areas for improvement; (3) relating present and future classes to entering the world of work; and (4) developing flexibility for changes that may occur in the future. 4 cr.

500. Occupational Competency Examination and Evaluation
Examination and/or evaluation to determine the level of competency within an occupation. Restricted to adult and occupational education majors. Prereq: permission. Special fee. 0–30 cr. Cr/F.

510. Leadership Techniques in Diverse Populations
Analysis of various historical theories and styles of leadership; characteristics of groups, group dynamics, and conflict resolution. Methods used in planning and conducting effective meetings. Methods of group problem solving and decision making. Analysis of leadership styles in diverse situations. 4 cr.

630. Development of Food and Fiber in Third World Countries
The world food situation and the role of agriculture and education in development of third world agrarian systems. Identification of constraints on food production, technology transfer, advantages and disadvantages of different agriculture systems, agricultural marketing, and career opportunities in international agriculture. Optional trip to United Nations over spring break. 4 cr.

650. Microcommunications
Organization, presentation, and evaluation of microlessons in a variety of educational settings. Preliminary experience and practice in communications. Variables of communicating under controlled conditions with videotaping for immediate feedback. Required for majors and minors. Special fee. 4 cr.

695. Investigations in Adult and Occupational Education
A) Career Education; B) Secondary Education; C) Postsecondary Education; D) Adult Education; E) Extension Education; F) Exemplary Education; G) Cooperative Education; H) Disadvantaged and Handicapped Education. An opportunity for undergraduates to address a special problem. Prereq: permission. May be repeated. 2–4 cr.

696. Field Experience
Work with an agency, institution, or organization to gain technical and/or professional competence not otherwise available. Student plans experience with departmental adviser. Credit approval subject to recommendation of faculty members and performance of student. Prereq: permission. 2–16 cr.

700. Workshops in Adult and Occupational Education
Modularized instruction of in-service education. Focus varies with the needs of the student. May be repeated up to 8 credits. 1–4 cr.

702. Concepts of Adult and Occupational Education
Development of occupational education in the U.S.; socioeconomic influences responsible for its establishment; federal and state requirements for secondary and postsecondary schools. Coordination of programs with general education and vocational fields. Focus on selected concepts relevant to adult education. Special attention on the adult as a learner, volunteer management, evaluation and accountability, experiential learning, and adult education. Required of all degree candidates in AOE concentrations. 4 cr.

752. Youth Organizations
Organizational Development (advising youth organizations; teaching parliamentary procedure; developing programs and activities; leadership).

FFA/SAEP (Future Farmers of America/Supervised Agricultural Experience Programs, for high school youth).

VICA (Vocational Industrial Clubs of America).

4-H (Cooperative Extension Youth Program). 4 cr.

753. Volunteer Program Development/ Administration
Principles of involving volunteers in programs. Application of theories of adult education and adult development to the planning and administration of programs that use volunteers. 3 cr.

783. Conducting and Supervising Adult Education Programs
Analysis of traditional and nontraditional adult education programs; development of strategies of program planning, instruction, evaluation, and supervision. 4 cr.

791. Planning for Teaching
Organization of materials of instruction to meet group and individual needs. Techniques of instruction, planning for teaching, function of consulting committees, working with youth groups, program evaluation. Course scheduled concurrently with EDUC 694. Prereq: Microcommunciations or permission. 4 cr.

796. Investigations in Adult and Occupational Education
A) Career Education; B) Secondary Education; C) Postsecondary Education; D) Adult Education; E) Extension Education; F) Exemplary Pro-

grams; G) Cooperative Education Programs; H) Disadvantaged and Handicapped Education Programs; I) International Agriculture. Student-selected problems in one of the areas listed. Elective after consultation with the instructor. Hours to be arranged. May be repeated. 2–4 cr.

Agricultural Mechanization

451. Welding and Fabrication Technology
Processes and procedures of welding (arc, oxy-acetylene, gas metal arc, gas tungsten arc) and metal fabrication. Lab. 3 cr.

461. Internal Combustion Engines, Principles and Maintenance
Internal combustion engines and their components with emphasis on how they function, preventive maintenance, and troubleshooting. Prereq: permission. Lab. 3 cr.

462. Internal Combustion Engines, Repair and Overhaul
Principles and techniques of engine overhaul. Each student is required to provide and overhaul, to factory specifications, at least one 4-stroke cycle engine. Prereq: Internal Combustion Engines, Principles and Maintenance; permission. Lab. 3 cr.

470. Residential Electricity
Electrical principles, laws, and installation with emphasis on the National Electrical Code. Prereq: permission. Lab. 3 cr.

475. Construction Methods and Materials
The materials and methodology of building construction with an emphasis on building science. Prereq: permission. Special fee. Lab. 4 cr.

Aerospace Studies (AERO), Reserve Officer Training Corps

(For program description, see page 90.)

Professor: Lt. Col. John A. LaMontagne
Assistant Professors: Capt. Timothy S. Burke, Capt. Gary P. Grover

Leadership Laboratory is required each semester of all Air Force ROTC students seeking commissions as second lieutenants in the U.S. Air Force upon graduation. Students taking Air Force ROTC courses for credit, but not seeking commissions, need not register for this lab.

301. Leadership Laboratory
Taken by all AFROTC cadets throughout enrollment in AFROTC. Command and staff leadership experiences in cadet corps. Air Force customs and courtesies, drill and ceremonies, career opportunities, and life and work of the junior officer. Student leadership potential developed in a practical, supervised laboratory. Field trips to Air Force installations. 0 cr.

415. The Air Force Today I
Mission and organization of today's Air Force as an instrument of the U.S. national defense policy. Customs and courtesies, officership, and followership are discussed. 1 cr.

416. The Air Force Today II
Air Force installations, fundamentals of Air Force written and verbal communication, and current events of interest to Air Force Officers are discussed. 1 cr.

541. The Development of Air Power I
The nature of warfare; development of air power from balloons and dirigibles through World War II. 1 cr.

542. The Development of Air Power II
Development of air power from post–World War II through the peaceful use of air power in Berlin; the Cuban crisis; air war in Southeast Asia; and research and development of present and future aerospace vehicles. 1 cr.

671. Air Force Management and Leadership I
An integrated management course emphasizing the individual as an officer/leader in the Air Force. Motivation and behavior, leadership, communication, group dynamics, and decision making in a changing environment. Air Force cases studied. 4 cr.

672. Air Force Management and Leadership II
Organizational and personal values; management of forces in change; organizational power, politics, managerial strategy, and tactics; Air Force cases studied. 4 cr.

681. National Security Forces in Contemporary American Society I
Focus on the armed forces as part of American society, emphasizing civil-military relations in context of U.S. policy formulation and implementation. Requirements for adequate national security forces; political, economic, and social constraints on the national defense structure; impact of technological and international developments on strategic preparedness; the variables involved in the formulation and implementation of national security policy. 3 cr.

682. National Security Forces in Contemporary American Society II
Focus on attitudes toward the military, socialization processes, role of the professional military leader-manager, and military justice and administrative law. 4 cr.

American Studies (AMST)

(For program description, see page 21.)

Coordinator: David H. Watters

501. Introduction to American Studies
Team-taught course on the basic methods used in the interdisciplinary study of history, literature, the arts, and other aspects of life and culture in the United States. Disciplinary approaches drawn from literature, history, art history, architecture, film, anthropology, sociology, etc. Required for students minoring in American studies. 4 cr.

502. Introduction to African-American Literature and Culture
An introduction to African-American literature in the context of a variety of cultural perspectives. Course topics may include: major writers, literary genres, historical periods, Harlem Renaissance, Black Arts Movement, fine and folk arts, religion, music, and film. (Also offered as ENGL 517.) 4 cr.

696. Seminar in American Studies
Seminar on an issue, problem, or theme in American studies. Required for students minoring in American studies. Prereq: AMST 501; one HUMA course in the 608–610 series; permission. 4 cr.

Animal Sciences (ANSC)

Department of Animal and Nutritional Sciences
(For program description, see page 42. For Dairy Management description, see page 45. For courses in Nutritional Sciences, see page 161.)

Chairperson: William A. Condon
Professors: William E. Berndtson, William A. Condon, Thomas P. Fairchild, James B. Holter, Samuel C. Smith, Willard E. Urban, Jr.
Adjunct Professor: Robert J. Nicolosi
Associate Professors: Joanne Curran-Celentano, Thomas L. Foxall, Colette H. Janson-Sand, Charles G. Schwab, Anthony R. Tagliaferro, Robert L. Taylor, Jr.
Assistant Professors: Dennis J. Bobilya, Elizabeth P. Boulton, Janet C. Briggs, Gale B. Carey, Patricia Dugan-Bedker, Carroll J. Jones, Richard S. Kingston, Paul C. Tsang, Allen J. Young
Adjunct Assistant Professors: Conrad H. Boulton, Mark S. Chagnon, Paul F. Cotter, Eugene J. Rogers
Instructor: Elizabeth C. Smith
Teacher/Trainer: Amy S. Dickens
Director of Preveterinary Programs: Joseph J. Moore

400. Food and People
Nutrition and food science; biological, social, political, economic, and historical significance of food. Animal food products. Special fee. (Credit cannot be received for both ANSC 400 and NUTR 400.) 4 cr.

401. Introduction to the Animal Sciences
Overview of dairy, livestock, light horse, and poultry industries; animal physiology, nutrition, genetics, and diseases; animal products and human health; animal science research. Special fee. Lab. 4 cr.

402. Horsemanship
For beginning, intermediate, and advanced riders. Basics of balance seat, specializing in basic dressage and combined training. Limited number of students may stable their horses at the University. Special fee. May be repeated for a maximum of 12 credits. 2 cr.

404. Introductory Equine Science
Study of the horse industry encompassing nutrition, genetics, breeds, selection procedures, and health maintenance. Lab. 4 cr.

405. Food and Society
Consideration of the cultural significance of food, emphasizing historical, psychological, social, political, and economic aspects. (Also offered as NUTR 405.) 4 cr.

406. Careers in Animal Science
Survey of various areas of animal and veterinary science and opportunities available. 1 cr. Cr/F.

408. Mathematical Applications in Agriculture
Practical experience in setting up and solving applied mathematical problems in dairy and animal sciences, agronomy, horticulture, land use and soils, water, buildings, materials and waste handling, environmental pollution, and interpretation of tables and figures. (Students may pretest out of the course with credit.) 2 cr.

504. Introductory Meats
Selection of meats for quality and economy. Study of wholesale cuts, retail cuts, and grading systems. Pricing of meats as affected by shrinkage and customer demand. Quality control as it affects shelf life of meats. Lab. 3 cr.

507. The Scientific Approach to Equine Discipline
Physiological development, control, and education; bitting, lunging, driving, and equine gymnastics. Prereq: ANSC 402; permission. Lab. 2 cr.

508. Dairy Production Techniques
Practical experience in dairy husbandry techniques. Only for students with no previous experience in dairy husbandry. Prereq: permission. 2 cr. Cr/F.

552. Introductory Dairy Herd Management
Economic principles and management factors involved in successful dairy herd management. Criteria for success, record keeping, applied genetics, housing, materials handling, feeding, and health care are topics covered. 3 cr. (Not offered every year.)

554. Introductory Dairy Herd Management Lab
Practical study of various aspects of dairy herd management. Farm visits and case studies will be involved. Should be taken concurrently with ANSC 552. 1 cr. (Not offered every year.)

602. Animal Rights and Societal Issues
To explore all aspects of human-animal interaction and welfare, emphasizing social, ethical, biological, historical, and economic aspects of animal care and use. (Juniors and seniors only.) Special fee. 4 cr.

603. Dairy Cattle Selection
Principles of selecting dairy cattle based on performance, pedigree analysis, progeny testing, and type evaluation. Lab. 2 cr.

604. Light Horse Selection
Principles of selecting light horses based on performance, pedigree, progeny records, and type evaluation. Lab. 2 cr.

607. Small Animal Diseases
Common diseases in companion animals; emphasis on canine and feline medicine. 2 cr.

609. Principles of Nutrition
Principles underlying nutrition of animals; digestion, absorption, and intermediary metabolism; function of nutrients in maintenance, growth, and production. Prereq: one year of chemistry; one semester of physiology. Special fee. Lab. 4 cr.

610. Feeds and Feeding
Classification, identification, and characteristics of animal feedstuffs; feed processing and palatability; feeding methods; balancing rations; specific application to dairy, beef, sheep, goats, swine, poultry, and horses. Lab. 4 cr.

611. Computer Applications and Records in Dairy Management
Emphasizes confidence and skills in the use of computers, with a major focus on using computers for tasks necessary for dairy management, including ration development, dairy records manipulation, and computer simulations. Also emphasizes the use of Dairy Herd Improvement Association records for making management decisions. Special fee. CS 401 recommended. 4 cr.

612. Genetics of Domestic Animals
Application of Mendelian principles to traits of domestic animals with particular emphasis on economically important traits of farm animals. Principles of population and quantitative genetics are introduced. Topics include sex linkage, Hardy-Weinberg Law, meiosis, elementary statistics, genetic relationships, and heritability. Lab. 4 cr.

#614. Diseases and Parasites of Wildlife
An ecological approach to some of the more common diseases and parasites of fishes, birds, game, and fur-bearing mammals. Influence of environment and management practices on the incidence and severity of diseases; relationship of wildlife diseases to human health. Prereq: permission. 3 cr. (Not offered every year.)

#616. Wildlife Disease Laboratory
Demonstrates necropsy techniques and examination of wildlife specimens for common parasitic and other diseases. Restricted to wildlife management majors only. Prereq or coreq: ANSC 614. 1 cr. Cr/F.

620. Equine Diseases
Body-systems approach to the discussion of medical and surgical diseases affecting the horse. Prereq: ANSC 404. 2 cr.

622. Equine Disease Clinic
Evaluation techniques of the normal and abnormal horse using the University horse herd. Discussion of clinical cases within the herd. Prereq: ANSC 404; coreq. ANSC 620. 2 cr.

623. Comparative Histology
Introduction to microscopic anatomy of domestic animal tissues and body systems with reference to human, avian, fish, and marine mammals. Structure and function briefly correlated. Prereq: ZOOL 507-508 or permission. 4 cr. Recommended for all premed, prevet, and predental students.

625. Equine Sports Medicine and Lameness
Limitations of the healthy horse in athletic competition and the prevention and treatment of equine athletic injuries with heavy emphasis on the musculoskeletal system. Prereq: ANSC 404; ZOOL 507-508. 4 cr.

630. Dairy Cattle Diseases
Covers the principles of immune response, disease development, immunological basis for disease control, management practices to maintain animal health, and dairy cattle disease identification and prevention. Coreq: ANSC 632. 2 cr.

632. Dairy Cattle Diseases Clinic
Clinical application of disease principles taught in ANSC 630, Dairy Cattle Diseases. Coreq: ANSC 630. 2 cr.

653-654. Principles of Teaching Equitation
Teaching techniques and procedures, with emphasis on dressage; opportunity to teach riding theory and techniques to other students under supervision of instructor. Teaching certificate awarded to students successfully completing course. Prereq: ANSC 402 and 507; permission. Special fee. Lab. A year-long course; 4 cr. each semester, 8 cr. total, an IA grade (continuous course) given at the end of first semester. Withdrawal from course results in loss of credit.

695-696. Supervised Teaching Experience
Participants are expected to perform such functions as leading discussion sections, directing and assisting in laboratories, and assisting students with their problems in courses that participants have completed successfully. Enrollment is limited to juniors and seniors who have a minimum 3.00 cumulative average. Prereq: permission of instructor and department chairperson. May be repeated up to a maximum of 4 credits. 1–2 cr. Cr/F.

697. Equine Seminar
Current equine industry issues, recent literature and research, and professional preparation. May be repeated to a maximum of 4 credits. 1 cr. Cr/F.

701. Physiology of Reproduction
Comparative aspects of embryology, anatomy, endocrinology, and physiology of reproduction. Special fee. Lab. 4 cr.

704. Principles of Pathobiology
Principles of disease processes; reactivity of the diseased cell, tissue, and organ. Prereq: ZOOL 507-508 or permission. 3 cr.

708. Ruminology
Anatomy of the ruminant gastrointestinal tract, physiological factors related to rumen function, and microbial metabolism of carbohydrates, protein, and lipids. Prereq: MICR 503 or equivalent. 2 cr.

710. Dairy Nutrition
Feeding and related management of dairy cows, nutrients and their use, digestive anatomy and physiology, energy systems, forage quality and conservation methods, metabolic disorders, economic ration balancing. Prereq: permission. 4 cr.

714. Research Methods in Endocrinology
Application of modern laboratory techniques to the study of hormonal and molecular mechanisms in the endocrine system. Prereq: ANSC 701 or BCHM 658 or ZOOL 704; permission. Special fee. Lab. 4 cr.

715. Physiology of Lactation
Examines the biological and biochemical influences of the lactation process. Emphasis on the physiological effects of environments, hormones, and nutrition on milk synthesis and secretion, mammary physiology, and maternal response. Prereq: junior standing or above; BCHM 658; ANSC 701. 4 cr.

718. Mammalian Physiology
Advanced study of the systems that control mammalian functions with emphasis on cellular and molecular mechanisms. Includes the nervous, muscular, cardiovascular, renal, gastrointestinal, and endocrine systems. Prereq: ZOOL 507-508; ZOOL 627 and one semester of biochemistry or permission. 4 cr.

#720. Public Health Nutrition
Focus on managerial processes of planning, leading, and evaluating community nutrition programs and the skills and tools needed to develop and present such programs. (Also offered as NUTR 720.) 4 cr. (Not offered every year.)

722. Immunogenetics
Cellular interactions leading to immune regulatory mechanisms. Emphasis is placed on the major histocompatibility complex, immune responses, and antibody diversity. (Also offered as GEN 722.) Lab. 4 cr. (Offered alternate years.)

724. Reproductive Management and Artificial Insemination
Focus on goals and fundamentals of reproductive management of horses, dairy and livestock animals, and, through actual experience, development of competency in performing modern breeding techniques for equine and bovine reproduction. Prereq: ANSC 701; permission. Special fee. Lab. 4 cr.

726. Advanced Dairy Management I
Advanced management evaluation of milking procedures, reproduction, genetics, nutrition, mastitis, and calf and heifer management. Coreq: ANSC 730. Prereq: junior or senior standing; permission. 2 cr.

727. Advanced Dairy Management II
Advanced management evaluation of dairy cattle housing, milking equipment, milk quality, record keeping, and herd health. Coreq: ANSC 731. Prereq: junior or senior standing; permission. 4 cr.

728. Advanced Dairy Management III
Advanced management evaluation of financial and business aspects, personnel management, environmental issues, public policy, and marketing genetics. Coreq: ANSC 732. Prereq: junior or senior standing; permission. 4 cr.

730. Dairy Internship I
The first of three semester internships which are required for all students in the dairy management program. Students assume responsibility for total management and care of the "teaching" herd of dairy cows at the UNH Dairy Teaching and Research Center. In addition to the hands-on experience, concurrent registration in ANSC 726 is required. Prereq: junior or senior standing; permission. 4 cr.

731. Dairy Internship II
The second of three semester internships which are required for all students in the dairy management program. Students assume responsihility for total management and care of the "teaching" herd of dairy cows at the UNH Dairy Teaching and Research Center. In addition to the hands-on experience, concurrent registration in ANSC 727 is required. Prereq: junior or senior standing; permission. 2 cr.

732. Dairy Internship III
The third of three semester internships which are required for all students in the dairy management program. Students assume responsibility for total management and care of the "teaching" herd of dairy cows at the UNH Dairy Teaching and Research Center. In addition to the hands-on experience, concurrent registration in ANSC 728 is required. Prereq: junior or senior standing; permission. 2 cr.

741. Senior Seminar (Résumés)
Students gain experience in developing and preparing résumés, interviewing skills, and developing and pursuing job contacts. Prereq: junior or senior standing; permission. 1 cr.

742. Senior Seminar (Issues)
Seminars and discussions on current topics pertinent to agriculture. Students are expected to facilitate group discussions, research relevant topics, and present several oral and written presentations that enhance writing and public speaking skills. Prereq: junior or senior standing; permission. 1 cr.

750. Nutritional Biochemistry
Detailed analysis of the digestion, absorption, transport, and intermediary metabolism of nutrients. Nutrient requirements are evaluated in the context of their physiological and biochemical functions. Prereq: ZOOL 507-508; BCHM 658; or equivalents. (Also offered as NUTR 750.) Special fee. 4 cr. (Fall semester only.)

751. Cell Culture
Theory and principles fundamental to culture of cells in vitro. Introduction to techniques of preparation and maintenance of animal, plant, insect, and fish cell cultures. Application of cell culture to contemporary research in biological sciences. Prereq: MICR 503; permission. (Also offered as MICR 751 and PBIO 751.) Special fee. Lab. 5 cr.

#760. Geriatric Nutrition
Emphasis on the nutritional requirements and status of the elderly in view of psychological and physiological changes in aging. Approaches for nutrition intervention and support will be addressed. Prereq: NUTR 400 and 499 or permission. (Also offered as NUTR 760.) 3 cr. (Summer session only.)

#773. Clinical Nutrition
Application of principles of normal nutrition and physiology to clinical problems; altered nutrient requirements in human disease. Prereq: basic nutrition and biochemistry or permission. Coreq: ANSC 775. (Also offered as NUTR 773.) 4 cr. (Spring semester only.)

#775. Practical Applications in Therapeutic Nutrition
Supervised practical experience in therapeutic dietetics in one of several cooperating New Hampshire hospitals. Emphasis on nutritional counseling, assessment, and instruction of patients with nutrition-related disorders. Coreq: ANSC 773. (Also offered as NUTR 775.) 3 cr. (Fall semester only.)

#780. Critical Issues in Nutrition
Critical review and analysis of controversial topics in nutrition; emphasis on developing oral and written communication skills and analytical reasoning skills. Prereq: permission. (Also offered as NUTR 780.) 4 cr. (Spring semester only.)

796. Investigations in the Animal Sciences
Problems in A) Genetics; B) Nutrition; C) Management; D) Diseases; E) Histology; F) Light Horsemanship; G) Physiology; H) Cell Biology; I) Microbiology. Prereq: permission. May be repeated. 1–4 cr.

#798. Contemporary Topics in Biomedical Science and Nutrition
Lecture-discussion series on topics in animal biology, nutrition, and medicine including production and applications of monoclonal antibodies; oncogenesis; sports nutrition; nutrition and cancer; toxicology; atherogenesis. 2 cr. Cr/F.

Anthropology (ANTH)

Department of Sociology and Anthropology
(For program description, see page 24.)

Chairperson: Stephen P. Reyna
Professor: Stephen P. Reyna
Associate Professors: Charles E. Bolian, Barbara K. Larson, Deborah Winslow
Assistant Professor: Nina Glick Schiller
Faculty-in-Residence, Assistant Professor: Les W. Field

411. Cultural and Social Anthropology
Cultural and social aspects of human behavior, particularly in relation to nonindustrial societies. Analysis of selected societies, institutions, and forms of social structure. 4 cr.

412. Physical Anthropology and Prehistoric Archaeology
Human physical evolution and cultural prehistory; evolutionary theory and archaeological techniques. 4 cr.

500. Peoples and Cultures of the World
A) North America; B) South America; C) Middle East and North Africa; D) Sub-Saharan Africa; E) South Asia; F) Southeast Asia; G) Oceania; Z) Other. Characteristic ecological, historical, and sociocultural factors in the major ethnographic regions of the globe. Analysis of selected societies and institutions. Offered in the following sections as staff is available and student needs dictate. **North America**. Study of the economy, society, religion, art, and ideas of North American Indians from precolonial times to the present. **South America**: A survey of the indigenous cultures and selected studies of the relationship between environment and culture. Changes in culture and social organization since the 16th century will be considered where historical data permit. **Middle East and North Africa**. The role of ecological, social, cultural, and historical factors in shaping Middle Eastern and North African culture today. Special attention will be paid to family, values, and religion; to nomadic, village, and urban ways of life; and to issues of unity, diversity, colonialism, and culture change. **Sub-Saharan Africa**: Study of Sub-Saharan economy, society, and culture from precolonial times to the present. **South Asia**: Emphasis on India, Sri Lanka, and Nepal. Traditional and changing South Asian cultures, including caste, family, economy, and religious traditions of Hinduism and Buddhism. **Southeast Asia**. Geographical, historical, ethnic, and sociocultural factors characteristic of the region. Impact of Indian, Chinese, Islamic, and European civilizations. Analysis of selected indigenous social, political, economic, and religious institutions. **Oceania**: Study of the economy, society, religion, art, and ideology of Pacific Island cultures from precolonial times to the present. 4 cr.

501. World Prehistory
A) North America; B) Mesoamerica; C) South America; D) Near East; E) Other. The development of prehistoric culture in various areas of the world. Offered in the following sections as staff is available and student needs dictate. **North America**. Archaeology of the Indians north of Mexico from earliest evidence of settlement to European contact. Diversity of cultures from ecological and evolutionary perspectives. Emphasis on the Eastern Woodlands, the Plains, and the Southwest. **Mesoamerica**. Cultural development from earliest cultures through the Spanish conquest. Emphasis on origins of agriculture and rise of Olmec, Teotihuacan, Mayan, Toltec, and Aztec civilizations. Stress on factors critical to the development of complex societies. **South America**. Cultural development from earliest migrations through Inca Empire. Focus on major regions of South America. Consideration of Intermediate Area, Amazon Basin, and Central Andes as core regions for foundations of civilization. **Near East**: From earliest cultures to the development of agriculture and settled village life. Examines the processes that gave rise to the world's first civilizations. 4 cr.

512. Introduction to World Ethnography
Primarily for majors and minors, but open to all students. Historical and geographic factors, types of social and economic organization, and problems involved in the comparative study of human societies and institutions. Analysis of selected peoples in the major ethnographic areas. 4 cr.

514. Method and Theory in Archaeology
Basic method and theory; techniques in recovering and interpreting data; laboratory exercises in ceramic and lithic analysis. Critical evaluation of archaeological literature. Prereq: ANTH 412 or permission. 4 cr.

515. Anthropology and Contemporary Issues
Anthropological approaches to current world issues such as racism, poverty, religious movements, revolution, and environmental stress. Selected topics examined in the context of both western and nonwestern societies. 4 cr.

#516. Kinship and Social Organization
The significance of kin and nonkin relations in human societies. Topics include the origins and evolution of human society, variations in the form and functions of marriage, family, and kin-based groups and selected nonkin relationships. Primary focus will be on nonindustrial societies. Prereq: ANTH 411 or permission. 4 cr.

517. Introduction to Anthropological Analysis
Basic skills of reading, writing, and analysis essential to the study of anthropology. Focus on learning to recognize, compare, and evaluate critically the central arguments of several major books drawn from different subfields and orientations in anthropology. Small class size for extensive discussion and feedback. Prereq: ANTH 411 or 412;/or permission. 4 cr.

518. History of Anthropological Theory
Reading and discussion of the works of major theoreticians of American, British, and French schools. Selections from the works of Spencer, Morgan, Tylor, Boas, Kroeber, Lowie, Steward, White, Durkheim, Mauss, Levi-Strauss, Malinowski, Radcliffe-Brown, Evans-Pritchard, and others are treated in terms of their contributions to the historical development of anthropology and their relevance to contemporary debates in anthropological theory. 4 cr.

#519. Social Change and Development: An Anthropological Perspective
Extraordinary growth of European and American economic and political power since 1450. Major social, cultural, and economic changes resulting from this growth, described from the anthropological literature for the developing world. Existing theories reviewed in terms of their ability to explain these changes. 4 cr.

600. Issues in Contemporary Anthropological Theory
Explores such recent directions in the discipline as cognitive/symbolic anthropology, cultural materialism, evolutionary theory, gender studies, interpretive anthropology, political economy, practice theory, and structuralism. Prereq: ANTH 518 or permission. 4 cr.

614. Economic Anthropology
Economics of nonindustrial societies; definition of economics: production, distribution, and consumption in selected societies; development. Prereq: ANTH 411 or permission. 4 cr.

616. Anthropology of Religion
Major anthropological theories of religion; analysis of religious beliefs as symbolic systems and their interrelations with ritual and other social institutions. Detailed study of specific religions. Prereq: ANTH 411 or permission. 4 cr.

618. Political Anthropology
Political processes and structures in nonindustrial societies. Major topics: centralization of power and authority, legal systems, and warfare. Prereq: ANTH 411 or permission. 4 cr.

625. Female, Male, and Society
Critical, cross-cultural study of sex-related behavior in historical as well as contemporary perspective. Draws on anthropological, social-psychological, and sociological literature. (Also offered as SOC 625.) 4 cr.

630. Anthropological Field Research
Explores in theory and practice a range of approaches to doing field studies in anthropology. Techniques such as life histories, questionnaires, projective tests, participant observation, and field diaries are explored in class and through active participation in a class research project. Prereq: ANTH 411; one 500-level or higher anthropology course;/or permission. 4 cr.

650. Field School in Archaeology
Field and laboratory methods in archaeology. Emphasis on excavation techniques and data analysis as related to project research design. Includes practical experience in lab as well as field. Prereq: permission. Special fee. 4–8 cr.

697. Special Topics in Anthropology
Occasional or experimental offerings. May be repeated for different topics. Prereq: permission. 4 cr.

699. Senior Thesis
Independent work in the library or field; recommended for, but not confined to, majors intending to pursue graduate studies; required for honors candidates. Contact staff to obtain approval and arrange supervision prior to senior year. 4 or 8 cr. 2 semesters. 8 cr. required for honors; an IA grade (continuous course) given at end of first semester.

#714. Caste, Class, and Colonialism
Peasants, urban communities, race and ethnicity, stratification, local-national integration, the effects of colonialism, modernization, and social change. Prereq: ANTH 411 or permission.

#750. Middle East: Issues of Ethnicity, Work, and Identity
Community studies approach to such topics as ethnicity and identity in the interrelationship of language, religion, and corporate membership in a community; ethnic division of labor; work, pluralism, and family networks; mobility and immobility; estates vs. classes. (Also offered as SOC 750.) 4 cr.

#770. Culture, Personality, and Society
A cross-cultural view of the development of personality as emergent from genetic, situ-

ational, and sociocultural determinants; analysis of the dynamic interplay of sociocultural and psychological behavior systems. Prereq: prior courses in sociology, anthropology, or psychology. (Also offered as SOC 770.) 4 cr.

795, 796. Reading and Research in Anthropology
A) Cultural/Social Anthropology; B) Anthropological Linguistics; C) Archaeology; D) Physical Anthropology. Prereq: 12 credits of anthropology; permission. Variable (normally 2–8) cr.

797. Advanced Topics in Anthropology
Advanced or specialized courses presenting material not normally covered in regular course offerings. May be repeated, but not in duplicate areas. Course descriptions on file in department office during registration. A) Social Organization; B) Economic Anthropology; C) Anthropology of Religion; D) Political Anthropology; E) Social Impact Analysis; F) Cultural Ecology; G) Prehistoric Archaeology; H) Historic Archaeology; I) Cultural Resources Conservation; J) Lithic Analysis; K) Ceramic Analysis; L) Faunal Analysis; M) Human Evolution; N) Human Variations; O) Anthropological Theory. Prereq: ANTH 411 or 412 (as appropriate);/or permission. 4 cr.

The Arts (ARTS)

(For program description, see page 24.)

Chairperson: Daniel L. Valenza
Professors: Arthur E. Balderacchi, Daniel L. Valenza, Mara R. Witzling, Melvin J. Zabarsky
Associate Professors: David S. Andrew, Patricia A. Emison, Chris Enos, Craig A. Hood, Maryse Searls McConnell, Michael McConnell, Scott Schnepf, Carol Shore, David R. Smith
Assistant Professors: Grant Drumheller, Eleanor M. Hight, Jennifer K. Moses
Faculty-in-Residence, Assistant Professor: Margaret H. McCann
Adjunct Assistant Professor: Vicki C. Wright
Lecturers: Joan Larson Esch, Lee Schuette, Jane K. Whitehead

Art Studio

Two-Dimensional Courses

Architecture
455. Introduction to Architecture
Study of architectural graphics, design theories, form determinants, and the architect in society. Includes case study projects. Lab. 4 cr.

Drawing
532. Introductory Drawing
Students deal primarily with observational perspective problems (still life, architectural interiors, landscape, etc.), utilizing a full range of drawing materials. Lab. 4 cr.

632. Intermediate Drawing
Continued use of traditional subject matter with emphasis on drawing the human figure from life; composition and content development. Prereq: ARTS 532. May be repeated for a maximum of 8 credits. Lab. 4 cr.

732. Advanced Drawing
Treatment of more complex compositional problems; application of a broader range of solutions to pictorial concepts to reinforce individual concepts of image and technique. Prereq: ARTS 632 (8 cr.). May be repeated for a maximum of 12 credits. Lab. 4 cr.

Painting
544. Water Media I
Transparent and opaque water color. Prereq: ARTS 546. Lab. 4 cr.

546. Introductory Painting
Use of the still life and the figure. Color, value, composition, and some art history. Slide lectures. Prereq: ARTS 532. Lab. 4 cr.

645. Water Media II
Continuation of ARTS 544; introduction to other water-based media. Prereq: ARTS 544. Lab. 4 cr.

646. Intermediate Painting
More complex issues of the visual language. Still life and the figure continue as dominant subject matter. Slide lectures. Prereq: ARTS 546. May be repeated for a maximum of 8 credits. Lab. 4 cr.

746. Advanced Painting
Development of a higher degree of technical skill to handle more advanced conceptual problems. Class assignments may be more individually directed. Prereq: ARTS 646 (8 cr.). May be repeated for a maximum of 12 credits. Lab. 4 cr.

Photography
551. Photography
Introduction to theory and practice of black and white photography as an expressive medium. Students provide their own cameras. Prereq: any art dept. course or permission. Lab. 4 cr.

651. Photography Workshop
Individualized projects involving creative methods, including color, manipulative, and documentary techniques. Students provide their own cameras. Prereq: ARTS 551. May be repeated. Lab. 4 cr.

Printmaking
536. Introduction to Printmaking: Intaglio
Study of intaglio printmaking techniques, including etching, dry point, and engraving. Prereq: ARTS 532 or permission. Lab. 4 cr.

537. Introduction to Printmaking: Lithography
Study of lithographic processes on stone and aluminum plate. Prereq: ARTS 532 or permission. Lab. 4 cr.

636. Printmaking Workshop
Emphasis on development of the individual's imagery in lithography and/or intaglio, including an introduction to multicolor printmaking. Prereq: ARTS 536 and/or ARTS 537. May be repeated for a maximum of 12 credits. Lab. 4 cr.

Three-Dimensional Courses

All courses elective by permission of the Department of the Arts.

Ceramics
501. Ceramics
Theory and practice of basic ceramics; includes all methods of basic construction, decoration, glazing, and kiln firing. Emphasis on each individual's perceptual development. Lab. 4 cr.

601. Ceramics Workshop
Application of new ceramic materials and techniques, with emphasis on ideas and their expression through form and content. Experimentation encouraged. Prereq: ARTS 501. May be repeated. Lab. 4 cr.

701. Clay and Glaze Calculation
Presentation and practice of a scientific method for calculating glazes, based on the empirical formula technique. Includes background information on clay and the chemistry of glazes and glaze materials. Prereq: ARTS 501. Lab. 4 cr. (Not offered every year.)

Sculpture
567. Introductory Sculpture
Theory and practice of designing three-dimensional compositions using a series of progressive assignments to develop a practical understanding of visual elements, including line, form, space, mass, and plane. Lab. 4 cr.

667. Sculpture Workshop
Design and production of sculpture focusing on various materials and techniques and how they relate to composition and content. Emphasis on understanding visual language while developing an individual style. Prereq: ARTS 567. May be repeated. Lab. 4 cr.

#767. Bronze Casting
Practice of designing, building, and maintaining a working sculpture foundry. Emphasis on a thorough understanding of the lost-wax investment casting process, including pattern making, mold making, wax working, investing, casting, chasing, and patination. Prereq: ARTS 667 (8 cr.). Lab. 4 cr.

Woodworking
525. Woodworking
Theory and application of basic woodworking principles; design concepts, primarily utilitarian, applied to shaping a mass, constructing volumetric and line/plane forms; use of a complete range of hand, portable powered, and stationary powered tools. Lab. 4 cr.

625. Furniture Design Workshop
Design and construction of the major furniture forms, using a broad range of techniques (including lamination, bending, and molding) to execute a series of concept areas relevant to furniture. Prereq: ARTS 455 or 525 or 567. May be repeated. Lab. 4 cr.

725. Wood Multiples
Development and construction of prototype furniture designs intended for more than one-of-a-kind production; jig and production strategies. (Offered concurrent to I.W.F.-sponsored bien-

nial National Student Furniture Design Competition.) Prereq: ARTS 625 (4 cr.). Lab. 4 cr.

Special Courses

598. Sophomore Seminar
Encourages experimentation by integrating verbal and plastic understandings through readings, discussions, studio work. Field trips. Prereq: two art history courses and two studio arts courses. 4 cr.

695. Special Problems in the Visual Arts
Topics and prerequisites to be announced before preregistration. May be repeated with permission of the instructor. Lab. 4 cr.

700H. Honors Seminar
Requires successful completion of a written thesis supervised by two faculty advisers (one each from studio and art history faculty) to be reviewed by members of the department honors committee. The art history thesis will involve an original problem in art history and the studio art thesis will examine the student's own work. Honors students only. 4 or 8 cr.

796. Independent Study in the Visual Arts
A) Photography; B) Sculpture; C) Drawing; D) Painting; E) Printmaking; F) Water Media; G) Architectural Design; H) Curatorial Assistant; I) Art History; J) Ceramics; K) Wood Design. Open to highly qualified juniors and seniors. Prereq: permission of department chairperson and supervising faculty member or members. May be repeated to a total of 8 cr. 1–8 cr.

798. Seminar/Senior Thesis
Readings and discussions oriented toward the intellectual premises of art. Culminates in mounting an exhibition of the student's work. Required of all students in the B.F.A. program. Other advanced students may elect with instructor's permission. A year-long course; an IA grade (continuous course) will be given at the end of the first semester. Lab. Variable credit; may be repeated to a total of 8 cr. B.F.A. majors must take 8 credits total. 1–8 cr.

Art History

All introductory (400- and 500-level courses in art history have the following goals: to introduce the discipline, its vocabulary, its periods and styles, its media, and its various approaches.

Exemption from prerequisites by permission of instructor.

431. Visual Studies
Appreciation and understanding of the visual arts. Works from variety of periods; emphasis on style, formal analysis, methods, and materials of production. For freshmen and sophomores; open to juniors and seniors by permission. Not for art dept. major credit. 4 cr.

480. Introduction to Art History
Analysis of the central forms and meanings of art history through intensive study of selected artists and monuments. The course will include works of architecture, sculpture, painting, and the graphic arts. Topics will vary but might include the Parthenon, Chartres cathedral, Michelangelo's Sistene Chapel ceiling, Rembrandt's self-portraits, Monet's landscapes, Picasso's Guernica, Frank Lloyd Wright's *Falling Water*, Georgia O'Keeffe's abstractions, *ukiyo-e* prints,and Benin sculpture. 4 cr.

487. Themes and Images in Art
Examination of one or two central ideas embodied in the artistic imagery of painting, sculpture, and architecture, covering a wide cultural spectrum. Stress on the interconnection between visual forms and the symbolic and philosophical concepts they express. Papers and essay examinations are required. A) Classicism and Its Discontents; B) Nature and Culture in Art; C) Primitivism and Modern Art; D) Major Mythic Images of Women; E) Symbols of Innocence and Experience in the New World; F) Abstraction and Ideology. Descriptions of sections available from the art department office. No more than one section of this course may be taken for credit. 4 cr.

570. Art of the Ancient World
The chief and representative monuments in architecture, sculpture, and painting from Paleolithic times to the late Roman Empire. The history of art from a broadly humanistic perspective with investigation of works such as Stonehenge, the pyramids at Giza, Mesopotamian votive figures, the Parthenon and its sculptures, and illusionistic Roman frescoes at Pompeii. 4 cr.

571. Art of the Middle Ages
The chief and representative monuments in architecture, sculpture, and painting from early Christian times to the Gothic era. The history of art from a broadly humanistic perspective with investigation of works such as the Constantinian basilicas, Byzantine mosaics, the Lindisfarne Gospels, the portal sculpture of Autun, and Chartres cathedral. 4 cr.

572. Art of the Age of Humanism
The chief and representative monuments in architecture, sculpture, and painting from the early Florentine Renaissance to the courtly era of Louis XVI. The history of art from a broadly humanistic perspective with investigation of works such as Masaccio's frescoes, Michelangelo's *David*, the Ghent Altarpiece, the basilica of St. Peter's, Rembrandt's self-portraits, and the Georgian house in Portsmouth. 4 cr.

573. Art of the Modern World
The chief and representative monuments in painting, sculpture, and architecture from the Age of Reason to the present. The history of art from a broadly humanistic perspective with investigation of works such as David's revolutionary paintings, Manet's *Olympia*, Rodin's *Gates of Hell*, Picasso's *Demoiselles d'Avignon*, Pollock's drip paintings, Warhol's soup cans, Serra's *Tilted Arc*, and the architecture of Ledoux, Wright, Le Corbusier, and Venturi. 4 cr.

574. Architectural History
A survey of the chief and representative buildings from the entire history of architecture. Analysis of buildings with regard to structure, form, and symbolic content, concentrating on major works such as the pyramids, the Roman Panthenon, the Gothic cathedral, the Renaissance palace, the Baroque church, and the modern skyscraper. 4 cr.

#608. Arts and American Society: Women Writers and Artists, 1850–Present
Team-taught course studying the impact of gender definitions on the lives and works of selected American artists. Considers lesser-known figures such as Fannie Fern, Lilly Martin Spencer, and Mary Hallock Foote as well as better-known artists such as Willa Cather and Georgia O'Keeffe. Prereq: permission or one of the following: WS 401, HIST 566, ENGL 585, 586, 685, 785, or a 600-level art history course. (Also offered as ENGL 608, HUMA 608, and HIST 608.) Studio art majors who take this course for major credit will not receive major credit for ARTS 610. 4 cr.

#610. Regional Studies in America: New England Culture in Changing Times
Team-taught course investigating some of the major contributions New England has made to American life. Focusing on three periods: the Puritan era, 1620–90; the Transcendental period, 1830–60; and the period of emerging industrialism in the late 19th century. (Also offered as ENGL 610, HIST 610, and HUMA 610.) Studio art majors who take this course for major credit will not receive major credit for ARTS 608. 4 cr.

654. 17th- and 18th-Century American Architecture
Chief colonial architectural styles and monuments; their relation to European antecedents. Field trips. Prereq: one 400- or 500-level art history course. 4 cr.

655. Early Modern Architecture: Revolution to World War I
Chief styles and monuments of American and European architecture from the visionaries (Ledoux, Latrobe, Jefferson) to the birth of the skyscraper and nonhistorical architecture. Unique American contribution to modern architectural thought. Field trips. Prereq: one 400- or 500-level art history course. 4 cr.

656. Contemporary Architecture: The Buildings of Our Times
Chief styles and monuments of American and European architecture from Frank Lloyd Wright and the International Style to the present. Field trips. Prereq: one 400- or 500-level art history course. 4 cr.

675. Greek and Roman Art
Art and architecture in ancient Greece and Rome from about 1500 B.C. through the fourth century A.D. Emphasis on classical Greek art of the fifth century B.C. and Roman Imperial art of the first and second centuries A.D. Prereq: one 400- or 500-level art history course. 4 cr.

676. History of Illuminated Manuscripts
During the Middle Ages manuscripts were the primary locus of the painting tradition. After a consideration of the development of the manuscript book and our method of study, this course will consider the major monuments of manuscript illumination and their painted cycles of miniatures. Such important works as the *Book of Kells*, the Winchester Bible, the Psalter of St. Louis, and the Trés Riches Heures of Jean de Berry are considered in their cultural and historical contexts. Prereq: one 400- or 500-level art history course. 4 cr.

677. Early Medieval Art
Development of Christian art from 300 to 1000 A.D. Study of the formulation of a new visual language via the intersection of Mediterranean and northern European traditions. Major focus on early Christian catacombs, Byzantine mosaics, insular manuscripts, and Carolingian imperial art. Prereq: one 400- or 500-level art history course. 4 cr.

678. Romanesque and Gothic Art
The culmination of medieval artistic development through examination of major architectural monuments and their sculptural programs, as well as important centers of manuscript illumination. The period from the year 1000 A.D. through the beginnings of the Renaissance in the early 15th century will be stressed. Prereq: one 400- or 500-level art history course. 4 cr.

679. Northern Renaissance Art I
Painting, sculpture, graphic arts, and manuscript illumination in France, Germany, and the Netherlands in the 14th and 15th centuries. Emphasis on the development of the traditions of Northern naturalism and the emergence in 15th-century Flanders of a distinct Renaissance consciousness, which runs parallel to contemporary trends in Italy. Major figures include the Limbourg brothers, Claus Sluter, Jan van Eyck, and Hugo van der Goes. Prereq: one 400- or 500-level art history course. 4 cr.

680. Northern Renaissance Art II
Painting, sculpture, and graphic arts in Germany and the Netherlands in the 16th century. Emphasis on the encounter of the Northern tradition with the classical and humanistic culture of the Italian Renaissance and on the impact of the Protestant Reformation. Major figures include Bosch, Dürer, Holbein, and Bruegel. Prereq: one 400- or 500-level art history course. 4 cr.

681. Italian Renaissance Art I
Painting, sculpture, and architecture in Italy during the 14th and 15th centuries. The emergence of Renaissance style in the art of such masters as Giotto, Masaccio, Donatello, Bellini, and Piero della Francesca. Attention is also given to the broad cultural developments to which they belong. Prereq: one 400- or 500-level art history course. 4 cr.

682. Italian Renaissance Art II
Continuation of ARTS 681. Primary focus on the formation of High Renaissance classicism in the art of Leonardo, Michelangelo, Raphael, Bramante, and Titian. Attention is also given to the subsequent crisis of the classical ideal in 16th-century mannerism. Prereq: one 400- or 500-level art history course. 4 cr.

683. Baroque Art in Southern Europe
Painting, sculpture, and architecture in Italy, France, and Spain during the 17th century. Emphasis on the diverse and innovative character of art in this period of crisis between the Renaissance and the modern era. Intensive analysis of the works of such major masters as Bernini, Caravaggio, Poussin, and Velazquez. Prereq: one 400- or 500-level art history course. 4 cr.

684. Baroque Art in Northern Europe
Dutch and Flemish painting in the 17th century. Examination of such major figures as Rubens, Rembrandt, Van Dyck, and Vermeer. Attention is also given to the development of the genres and to the many little masters who practiced them. Prereq: one 400- or 500-level art history course. 4 cr.

686. Neo-Classicism to Romanticism
European painting and sculpture in its sociopolitical context, with emphasis on the relation of idea to image, from David and the French Revolution to the romantic landscapes of Freidrich and Runge, and the romantic-classic debate involving Delacroix and Ingres. Prereq: one 400- or 500-level art history course. 4 cr.

687. Realism and Impressionism
The rise of realism and impressionism in the second half of the 19th century in France. Emphasis on the influence of the *plein air* sketch of the English and Barbison landscape painters, the realism of Courbet and Millet, the Hausmannization of Paris and the painting of modern life, Seurat and neo-impressionism, and the late works of Cézanne and Monet. Prereq: one 400- or 500-level art history course. 4 cr.

688. Twentieth-Century Art I
Evolution of modernism from symbolism and post-impressionism to World War II. Emphasis on the art and theory of cubism, expressionism, abstraction, surrealism, and social realism. Prereq: one 400- or 500-level art history course. 4 cr.

689. Twentieth-Century Art II
Examines abstract expressionism as a framework for analyzing art since World War II. Focus on "Action Painting" and Color Field Painting, minimalism and conceptual art, pop art, earthworks and cited sculpture, new image painting, post-modernism, and related critical theory. Prereq: one 400- or 500-level art history course. 4 cr.

690. Women Artists of the Nineteenth and Twentieth Centuries
Examination of the works of women artists of the past two centuries. After considering current scholarship related to some of the theoretical issues involved in studying art by women, the works of women artists from the Middle Ages through the early 19th century will be surveyed briefly. Focus will then shift to works by women artists of the past 150 years and their relationship to and impact on major movements in modern art. Prereq: one art history and another appropriate course. 4 cr.

692. History of Photography
History of the photograph from its origins in the aesthetic and technological context of the early 19th century to the present. Lectures and discussions on such topics as the impact of early photography on painting, 19th-century landscape and travel photography, pictorialism, abstract photography, the photograph as metaphor, photojournalism and the interpretation of war, and post-modernism and photography. Critical reading of texts by Beaudelaire, Benjamin, Barthes, Sontag, and Sekula. Prereq: one 400- or 500-level art history course. 4 cr.

693. American Art
A chronological survey of painting and sculpture in the United States from the colonial period to the present. Prereq: one 400- or 500-level art history course. 4 cr.

#697. Art of the Far East
Examination of the major trends in painting, sculpture, and architecture of India, China, and Japan, with emphasis on the relation of philosophical concepts to imagery. Prereq: one 400- or 500-level art history course.

699. Museum Studies
Introduction to the history and practices of American museums, including their purposes, organization, interpretation, policies, and procedures. Use of The Art Gallery, visits to other museums, lecturers. Prereq: two courses in art history and permission. 4 cr.

795. Methods of Art History
Essential bibliography and the methodology of research; the variety of approaches to art historical scholarship. Readings, discussion, and projects in connoisseurship, iconography, and other art historical methods. Open to advanced students with a strong art history background. It is strongly recommended that students take this course in their junior year. Prereq (for non–art history majors): permission. 4 cr. (Usually offered fall semester only.)

799. Seminar in Art History
Topics and prerequisites to be announced before preregistration. May be repeated with permission of instructor. 4 cr.

(See also ARTS 695, 700H, and 796 under Special Courses.)

Art Education

All courses elective by permission of the Department of the Arts.

791. Art Education (Elementary)
Children's creative growth as revealed through their visual expression. Development of elementary art education programs with emphasis on objectives, methods, materials, and techniques to foster that creativity. Suggested prereq: EDUC 500. 4 cr.

792. Art Education (Secondary)
The creative process in the visual arts in relation to the development and skills of middle and high school students in the public schools; mechanics of beginning and maintaining a second-

ary art program; exploring resources for art education programs on the secondary level. Suggested prereq: EDUC 500. 4 cr.

#797. Art Education Seminar
Architecture as a resource in teaching. Primarily for secondary school teachers and those involved in adult education. Not for major credit in art dept. 4 cr. (See also ARTS 796.)

Biochemistry and Molecular Biology (BCHM)

(For program description, see page 42.)

Chairperson: James A. Stewart
Professors: Donald M. Green, Samuel C. Smith, Stacia A. Sower, James A. Stewart
Associate Professors: Clyde L. Denis, Anita S. Klein, Andrew P. Laudano, Thomas M. Laue
Assistant Professors: John J. Collins, Rick H. Cote

658. General Biochemistry
A comprehensive, introductory course emphasizing the cellular metabolism and the structure and function of proteins, nucleic acids, carbohydrates, and lipids. Coreq: BCHM 659 (except BCHM majors who are encouraged to take BCHM 755). Prereq: BIOL 411, CHEM 545-546, CHEM 547-548, or CHEM 651-652. 3 cr.

659. General Biochemistry Laboratory
Structured laboratory experiments that provide training in analytical and preparative techniques fundamental to modern biochemistry and molecular biology. Coreq: BCHM 658 (except for BCHM majors who are encouraged to take BCHM 755 instead of BCHM 659). Special fee. 2 cr.

704. Endocrinology
Structure and function of vertebrate endocrine systems. Influence of endocrine system on the molecular and biochemical mechanisms and physiology of vertebrates, with special reference to mammals. Current investigations of the endocrine system as a regulator and integrator of body functions including such systems as growth, reproduction, metabolism, differentiation, and behavior. (Also offered as ZOOL 704.) Prereq: BCHM 658 or 751;/or permission. 4 cr.

750. Physical Biochemistry
Structure, interactions, and physical-chemical properties of biomolecules. Thermodynamic, hydrodynamic, and spectroscopic methods for study of proteins and nucleic acids. Laboratory work focuses on theory and design of biochemical instrumentation. Prereq: CHEM 683; BCHM 751;/or permission. 3 cr.

751-752. Principles of Biochemistry
In-depth survey of biochemistry; macromolecule structure; metabolism of proteins, nucleic acids, carbohydrates, and lipids; molecular biology of DNA, RNA, and protein synthesis and regulation. Prereq: CHEM 547-548 or CHEM 651-652 or CHEM 545 and 546;/or permission. 3 cr

755. Laboratory in Biochemistry and Molecular Biology
Application of modern techniques to the characterization of biomolecules, with an emphasis on proteins and nucleic acids; analysis of enzyme kinetics; and basic techniques used in molecular biology. (Majors anticipating taking BCHM 799 should take this course in their junior year.) Prereq: BCHM 751;/ or permission. Special fee. 5 cr.

760. Cellular Signalling Processes
Signal transduction and the regulation of metabolism, cell growth, and cellular activation; molecular basis of cellular communication. Prereq: BCHM 658 or 751;/or permission. 3 cr.

763. Biochemistry of Cancer
Molecular mechanisms of viral and chemical carcinogenesis; role of oncogenes in normal cell growth, development, and differentiation. Biochemical basis of cancer chemotherapy. Prereq: BCHM 658 or 751;/or permission. 3 cr.

764. Membrane Structure and Transport
Transport properties of biological membranes and membrane proteins; mechanisms of protein translocation, processing, and trafficking; bioenergetic membranes. Prereq: BCHM 658 or 751;/or permission. 3 cr.

765. Molecular Biology and Biochemistry of Plants
Molecular mechanisms and regulation of plant metabolic functions. Structure and function of cellular constituents of plants; roles of secondary metabolites. Emphasis on developments in current literature. Complements PBIO 774/775. Prereq: BCHM 658 or 751; BIOL 604;/or permission. (Also offered as PBIO 765.) 3 cr.

771. Molecular Genetics
Structure, organization, replication, dynamics, and expression of genetic information in eukaryotes. Focus on molecular genetic *mechanisms* of gene expression and its control; molecular genetics *methods*; molecular genetic control of cell division and differentiation during development. Prereq: BCHM 658 or 751; BIOL 604;/or permission. (Also offered as GEN 771.) 3 cr.

772. Introductory Laboratory in Molecular Genetic Techniques
Biochemical gene manipulation techniques including the genetic, physical, and enzymatic characterization of gene vectors, gene cloning, construction of genetic probes, and sequencing of nucleic acids. Prereq: BCHM 658 or 751; and BIOL 604;/or permission. (Also offered as GEN 772.) Special fee. 3 cr.

782. Developmental Genetics
The molecular genetic basis of metazoan development. Focuses on how genes direct the process of development and how this problem is analyzed in model organisms using molecular genetic approaches. Topics include: control of cell division, maternal factors, cell-cell interactions, and differential gene expression. Prereq: BIOL 604; BCHM 658 or 751. (Also offered as GEN 782.) 3 cr.

795. Investigations in Biochemistry and Molecular Biology
Independent research experience in the following areas: A) Developmental Genetics; B) Signal Transduction; C) Gene Regulation; D) Molecular Genetics; E) Molecular Evolution; F) Biochemistry of Cancer; G) Biophysics of Macromolecules; and H) Teaching Experience. Prereq: permission. Not more than 4 total credit hours can be applied to BCHM or major electives. 1–4 cr.

799. Senior Thesis
Research in biochemistry and molecular biology for senior majors. A) Developmental Genetics; B) Signal Transduction; C) Gene Regulation; D) Molecular Genetics; E) Molecular Evolution; F) Biochemistry of Cancer; G) Biophysics of Macromolecules. Prereq: BCHM 659 or 755; permission. 2 cr. Can be repeated to 4 cr.

Biology (BIOL)

(For program description, see page 43.)

Coordinator: James E. Pollard

400. Professional Perspectives on Biology
Views scope of biology and explores professional opportunities for biological sciences majors. Guest speakers from on and off campus present seminars and lead discussions on contemporary issues in biology; departmental and interdepartmental major and option programs; and strategies for achieving professional goals. Required for all first-semester biology majors. 1 cr. Cr/F.

401. Human Biology
(This course has been renumbered as ZOOL 401. See the description under ZOOL 401, page 188.)

402. Environmental Biology
(This course has been renumbered as ZOOL 402. See the description under ZOOL 402, page 189.)

411. Principles of Biology I
Introduction to structure and function of cells; tissues and organs; physiological processes; genes and heredity. Required for majors in the biological sciences. Special fee. Lab. 4 cr.

412. Principles of Biology II
The biology of organisms, including survey of kingdoms, behavior, evolution, and ecology. Required for majors in the biological sciences. Special fee. Lab. 4 cr.

#420. Parasites and Pestilence
Ecology of human disease; role of disease in history; biological, social, and economic problems involved in eradication and control. Particular attention to diseases that still account for serious sickness and mortality in overpopulated, underdeveloped countries. No credit toward a major or minor. 4 cr.

541. General Ecology
Physical and biological factors affecting distribution, abundance, and adaptations of organisms. Population, community, and ecosystem structure and function. Prereq: BIOL 411-412 or equivalent. Special fee. Lab. 4 cr.

604. Principles of Genetics
Chemical structure of genetic material, Mendelism, gene recombination, and chromosome mapping. Mutation, gene expression and regulation, recombinant DNA. Quantitative inheritance and population genetics. Prereq: BIOL 411 and 412; CHEM 403 and 404. College math or statistics suggested. Offered each semester. Special fee. 4 cr.

605. Eukaryotic Cell and Developmental Biology
Cell and developmental biology of eukaryotic animals and plants. General topics include the structure and function of major cellular compartments, an analysis of intracellular dynamics, mechanisms of intercellular chemical communication, and mechanisms for elaborating and integrating multicellular animals and plants. Special topics include mitogenesis, cell motility, oncogenesis, control of gene expression, and pattern formation. Prereq: BIOL 411 and 412; CHEM 403 and 404. Special fee. Lab. 3 cr.

695, 696. Biology Teaching Practices
Students assist in teaching labs in undergraduate biology courses, supervised by the lab coordinator/instructor. Responsibilities include facilitating lab endeavors, giving a presentation, and writing a report. Prereq: permission. 1–4 cr. Can be repeated to 8 cr.

795, 796. Biology Independent Investigations
A) Teaching—teaching practicum in a biological science supervised by a biology faculty member. Prereq: permission. B) Research—research practicum in a biological science supervised by a biology faculty member. Prereq: permission. C) Special topics—selected topics of current interest in biology. Lecture-discussion format. Prereq: 12 credits of biology or permission. 1–4 cr. Can be repeated to 4 cr.

791. Problems in the Teaching of High School Biology
Objectives and methods; selection and organization of materials, preparation of visual aids and other projects; use of field trips. Prereq: two years of biological science; permission. 4 cr.

Departmental Biology Courses

(Other biological science courses include those listed and described under the following department/program headings: Animal Sciences, p. 101; Biochemistry and Molecular Biology, p. 108; Entomology, p. 133; Genetics, p. 137; Microbiology, p. 156; Natural Resources, p. 159; Nutritional Sciences, p. 161; Plant Biology, p. 171; and Zoology, p. 190.)

Business Administration (ADMN)

(For program description, see page 81. For faculty listings, see pages 99, 119, 123, 144, 149, 150.)

685-686. Study Abroad
Open to students studying abroad in the discipline as approved by the department chair and Undergraduate Programs Office. 1–16 cr. Cr/F.

695. Independent Study
Individual research projects that are student designed. Initial sponsorship of a business administration faculty member must be obtained, and approval of WSBE Undergraduate Programs Office and department chair. For juniors and seniors in high standing. 1–12 cr.

696. Supervised Student Teaching Experience
Participants are expected to perform such functions as leading discussion groups, assisting faculty in undergraduate courses that they have successfully completed, or working as peer advisers in the advising center. Enrollment is limited to juniors and seniors who have above-average G.P.A.s. Reflective final paper is required. Prereq: permission of instructor, department chair, and director of undergraduate programs. 1–4 cr. May be repeated to a maximum of 4 cr. Cr/F.

795. Internship
On-the-job skill development through fieldwork in an organization (business, industry, health, public service, etc.). Normally, supervision is provided by a qualified individual in the organization, with frequent consultation by a faculty sponsor. Written report required. Internships may be part or full time, with course credits assigned accordingly. May not be used as a Group C elective. Prereq: permission of instructor, department chair, and director of undergraduate programs. 1–16 cr. Cr/F.

798. Topics in Business Administration
Special topics; may be repeated. Prereq: permission. 2–4 cr.

799. Honors Thesis/Project
Supervised research leading to the completion of an honors thesis or project; required for graduation from the honors program in administration. Prereq: permission of director of undergraduate programs and department chair. 4–8 cr.

Chemical Engineering (CHE)

(For program description, see page 56.)

Chairperson: Stephen S. T. Fan
Professors: Stephen S. T. Fan, Ihab H. Farag, Virendra K. Mathur, Gael D. Ulrich
Associate Professors: Dale P. Barkey, Russell T. Carr, Donald C. Sundberg
Assistant Professor: Palligarnai T. Vasudevan

410. Survey of Current Energy and Pollution Control Technology
Energy supply in this country and the world; conventional fuel reserves: coal, oil, natural gas; alternative sources: nuclear, solar, geothermal, etc. Forecasts and strategies to meet needs. Environmental pollution, sources, and economic and environmental impacts. Methods for pollution control. Regulatory standards for environmental protection. Prereq: good background in high school chemistry. 4 cr.

501. Introduction to Chemical Engineering I
Systems of units; material balances and chemical reactions; gas laws; phase phenomena. 3 cr.

502. Introduction to Chemical Engineering II
Energy and material balances for systems with and without chemical reactions; design case studies. 3 cr.

601. Fluid Mechanics and Unit Operations
Continuity, momentum, and energy equations; laminar and turbulent flow in pipes; rheology. Applications to flow in porous media, filtration, and fluidization. 3 cr.

602. Heat Transfer and Unit Operations
Thermal properties of materials, steady-state and transient conduction and convection; radiation; applications to heat exchangers and process equipment. 3 cr.

603. Applied Mathematics for Chemical Engineers
Mathematical modeling and analysis of chemical engineering problems. Analytical methods for first- and second-order differential equations; numerical solutions; series solutions; Bessel functions; Laplace transforms; matrix algebra. Interpretation and solution of partial differential equations. Prereq: knowledge of FORTRAN programming. Lab. 4 cr.

604. Chemical Engineering Thermodynamics
Volumetric and phase behavior of ideal and real gases and liquids; cycles; steady-flow processes; chemical equilibrium. Lab. 4 cr.

605. Mass Transfer and Stagewise Operations
Diffusion in gases, liquids, and solids; design and analysis of distillation, absorption, adsorption, extraction, and other stagewise equipment and operations. 3 cr.

606. Chemical Engineering Kinetics
Use of laboratory data to design commercial reactors. Continuous, batch, plug-flow, and stirred-tank reactors for homogeneous and catalytic multiphase reactions. 3 cr.

608. Chemical Engineering Design
Introduction to cost engineering. Application of acquired skills to design of chemical processes. Individual, major design project required. Lab. 3 cr.

612. Chemical Engineering Laboratory I
Selected experiments in fluid mechanics, heat transfer, and unit operations. 3 cr.

613. Chemical Engineering Laboratory II
Selected experiments in mass transfer, stagewise operations, thermodynamics, and kinetics. 3 cr.

695. Chemical Engineering Project
Independent research problems carried out under faculty supervision. 1–4 cr.

696. Independent Study
Prereq: permission of the adviser and department chairperson; granted only to students having superior scholastic achievement. 1–4 cr.

701. Introduction to Polymer Engineering
Principles of polymer chemistry, polymerization kinetics, polymer rheology, and material characteristics. Design and analysis of polymer reactors, extruders, molding machines, and other forming operations. Lab. 4 cr.

705. Natural and Synthetic Fossil Fuels
Study of U.S. and foreign reserves of coal, oil, and natural gas. Petroleum processing and refining. Coal, oil shale, and tar sand. Gasification and liquefaction of coal. Lab. 4 cr.

709. Fundamentals of Air Pollution and Its Control
The origin and fate of air pollutants. Fundamentals of atmospheric meteorology, chemistry, and dispersion phenomena. Control of air pollutants and the related equipment. Current issues. Prereq: MATH 527; CHEM 403-404. Lab. 4 cr.

712. Introduction to Nuclear Engineering
Development of nuclear reactors; binding-energy; radioactivity; elements of nuclear reactor theory; engineering problems of heat transfer, fluid flow, materials selection, and shielding; environmental impacts. 4 cr.

#744. Corrosion
Fundamentals of corrosion processes in industrial and environmental settings; thermodynamics, kinetics, and mass transport in local corrosion cells; protection by electrochemical, chemical, surface modification or barrier methods; instrumental methods in corrosion science. Lab. 4 cr.

751. Process Simulation and Optimization
Techniques for computer-aided analysis of chemical processing systems. Development of mathematical models to describe process behavior. Application of optimization techniques. Prereq: a knowledge of FORTRAN programming. Lab. 4 cr.

752. Process Dynamics and Control
Dynamic behavior of chemical engineering processes described by differential equations; feedback control concepts and techniques; stability analysis. Lab. 4 cr

#754. Graphic, Numerical, and Finite Element Applications in Chemical Engineering
Computational methods for solving differential equations resulting from the modeling of a process or physical phenomena. Graphical display of results of data and of curve-fitted equations. Use of interactive graphics and the solution of boundary-value problems. Applications of finite element analysis and discussion of other software available. Prereq: CHE 603 or permission of instructor; a knowledge of FORTRAN programming. 4 cr.

761. Biochemical Engineering
Immobilized enzyme technology, microbial biomass production, transport phenomena in microbial systems, biological reactor design, process instrumentation and control, applications in separation and purification processes. Lab. 4 cr.

772. Physicochemical Processes for Water and Air Quality Control
Origin and characterization of pollutants. Controls, including filtration, sedimentation, coagulation and flocculation, absorption and adsorption. Applied fluid mechanics, mass transfer, and kinetics. Thermal pollution, chemical treatment, oil spills on water, and aeration. Lab. 4 cr.

Chemistry (CHEM)

(For program description, see page 57.)

Chairperson: Paul R. Jones
Professors: Kenneth K. Andersen, N. Dennis Chasteen, Colin D. Hubbard, Richard P. Johnson, Paul R. Jones, James D. Morrison, W. Rudolf Seitz, James H. Weber, Edward H. Wong
Associate Professors: Christopher F. Bauer, Howard R. Mayne, Roy Paul Planalp, Sterling A. Tomellini, Gary R. Weisman
Assistant Professors: Chifuru Noda, Charles K. Zercher

#*401-402. Introduction to Chemistry
Elementary, broad view of chemistry; emphasizes topics related to everyday life. For students who do not intend to take any other chemistry courses, and those interested in satisfying a science requirement. Not a prerequisite for any other chemistry courses. Lab. 4 cr. (Not offered every year.)

***403-404. General Chemistry**
Fundamental laws and concepts applied to nonmetals, metals, and their compounds. For students who plan to take further chemistry courses. Previous chemistry recommended. Knowledge of algebra, exponentials, and logarithms required. Special fee. Lab. 4 cr.

***405. General Chemistry**
Basic principles; atomic structure, bonding, equilibria, and thermodynamics. First course for chemistry majors. Prereq: one year of high school chemistry, algebra, and knowledge of exponentials and logarithms. Cannot be taken for credit if credit received for CHEM 403-404. Not recommended for premedical students. Lab. Special fee. 4 cr.

***406. Quantitative Analysis**
Studies of pollution, environmental problems, and the more traditional professional work in chemistry rely heavily on a sound knowledge of analytical chemistry. Gravimetric and volumetric analysis, potentiometry, spectrophotometry, and selected separations methods. Prereq: CHEM 404 or 405. Coreq: CHEM 407. 3 cr.

407. Quantitative Analysis Laboratory
Gravimetric and volumetric analysis; chemical separations; potentiometry and spectrophotometry. Treatment of data, error analysis, and calculation of results. Coreq: CHEM 406. Special fee. 2 cr.

#409. Chemistry and Society
Elementary survey of chemistry; integrates principles and applications. For students who do not intend to take any other chemistry courses and those interested in satisfying a general education science requirement. Not a prerequisite for any other chemistry course. Lab. 4 cr. (Not offered every year.)

517. Quantitative Analysis
For students planning careers in medicine, dentistry, plant and animal science, nursing, oceanography, and environmental science. Volumetric methods, separations, and instrumental methods. Prereq: CHEM 404 or 405. Coreq: CHEM 518. 3 cr.

518. Quantitative Analysis Laboratory
Volumetric methods with an emphasis on technique; separations; and selected instrumental methods such as potentiometry, spectrophotometry, atomic absorption, and gas chromatography. Special fee. Coreq: CHEM 517. 2 cr.

520. Seminar in Environmental Chemistry
Several speakers on environmental topics such as water quality, atmospheric chemistry, and hazardous waste. Includes reading assignments from the environmental literature, classroom discussion, and a presentation to the class. Prereq: CHEM 404 or 405, 547-549, or 651-653 and permission. Coreq: CHEM 548-550 or 652-654. 2 cr.

545. Organic Chemistry
Introductory study of carbon compounds for those who desire a brief terminal course. Prereq: CHEM 404 or 405. Coreq: CHEM 546. Students receiving credit for CHEM 545 may not receive credit for CHEM 402, 547-548, or 651-652. 3 cr.

546. Organic Chemistry Laboratory
Coreq: 545. Special fee. 2 cr.

547-548. Organic Chemistry
Principal classes of organic compounds, aliphatic and aromatic; class reactions and structural theory. Intended primarily for chemistry, chemical engineering, and biochemistry majors. Prereq: CHEM 404 or 405;/or permission. Coreq: CHEM 549-550. Students receiving credit for CHEM 547-548 may not receive credit for either CHEM 545 or 651-652. 3 cr.

* Students receive credit for only one course from 401, 403, 405, and 409, and for only one course from 402 and 404.

549-550. Organic Chemistry Laboratory
Coreq: 547-548. Special fee. Lab. 2 cr.

574. Introduction to Inorganic Chemistry
Elementary concepts including periodicity, descriptive chemistry of metals and nonmetals, and coordination compounds. Prereq: CHEM 404, 405, or permission. 3 cr.

651-652. Organic Chemistry
Principal classes of organic compounds, aliphatic and aromatic, class reactions and structural theory. Intended primarily for pre-healing arts, biological science, and health science students. Prereq: CHEM 404 or 405;/or permission. Coreq: CHEM 653-654. Students receiving credit for CHEM 651-652 may not receive credit for either CHEM 545 or 547-548. 3 cr.

653-654. Organic Chemistry Laboratory
Coreq: 651-652. Special fee. 2 cr.

683-684. Physical Chemistry I, II
The properties of gases, liquids, and solids; thermochemistry and thermodynamics; solutions, chemical equilibria, reaction rates, conductance, and electromotive force. Prereq: CHEM 404 or 405; MATH 426; pre- or coreq: PHYS 407 or 402; coreq: CHEM 685-686. 3 cr.

685-686. Physical Chemistry Laboratory
Measurement of thermodynamic properties, chemical kinetics, and methods of determining the structure of matter. Prereq: CHEM 404 or 405; MATH 426; pre- or coreq: PHYS 407 or 402; coreq: CHEM 683-684. Special fee. 2 cr.

696. Independent Study
For exceptional students. Individual reading, writing, or laboratory work carried out under the tutelage of a faculty member. May be used to replace specific required courses in chemistry. Prereq: approval of the adviser and department chairperson. Credits to be arranged.

698. Seminar
Student reports on topics of interest. Prereq: CHEM 548 or 652; CHEM 684. 1 cr.

699. Thesis
Yearlong investigation in a selected topic, with background and experimental investigation. For chemistry majors who have completed CHEM 548, 684, and 762. Required for B.S. majors. Strongly recommended for B.A. chemistry majors. Prereq: 2.50 average or permission. Lab. Two semesters of 4 cr. each are required. 4 cr./semester.

708. Spectroscopic Investigations of Organic Molecules
Survey of the use of modern spectroscopic techniques for the identification and structural and dynamic characterization of organic compounds. Topics include proton and carbon-13 nuclear magnetic resonance spectroscopy, infrared spectroscopy, and mass spectroscopy. Problem solving is emphasized. 1–4 cr.

755. Advanced Organic Chemistry
Methods of synthesis and determination of structure, including stereochemistry of complex organic compounds. Prereq: CHEM 548 or 652 or equivalent. Coreq for CHEM majors: 756. 3 cr.

756. Advanced Organic Chemistry Laboratory
Synthesis and structural determination of complex organic compounds, techniques for the separation, determination of purity, and identification of compounds by spectroscopic and chemical means. Coreq for CHEM majors: 755. Special fee. 3 cr.

762. Instrumental Methods of Chemical Analysis
Theory, instrumentation, and application of methods such as atomic absorption, coulometry, emission spectrography, gas and liquid chromatography, polarography, potentiometry, IR and UV–VIS absorption spectrophotometry, and mass spectrometry to chemical analysis. Prereq: CHEM 406 or 517; CHEM 684 as a pre- or corequisite;/or permission. Coreq: CHEM 763. 3 cr.

763. Instrumental Methods of Chemical Analysis Laboratory
Experimental parameters, error analysis, and applications of the methods covered in CHEM 762. Coreq: CHEM 762. Special fee. 2 cr.

774. Inorganic Chemistry
Basic theoretical concepts and their applications to inorganic reactions and compounds. Prereq: organic chemistry; physical chemistry;/or permission. Coreq: CHEM 775. 3 cr.

775. Inorganic Chemistry Laboratory
Synthesis and characterization of inorganic compounds with an emphasis on techniques not taught in other laboratory courses. Coreq for undergraduates: CHEM 774. Special fee. 2 cr.

776. Physical Chemistry III
Application of quantum theory to atomic electron structure, spectroscopy, and molecular structure. Prereq: CHEM 683-684. Lab. Special fee. 4 cr.

778. Chemistry of Large Molecules
Basic chemistry of high-molecular-weight compounds, including synthetic polymers and substances occurring in living systems. Elementary aspects of the structures, syntheses, and properties of large molecules, and their roles in modern science, technology, and living systems. Prereq: one semester of organic chemistry. 4 cr. (Not offered every year.)

Chinese (CHIN)

#401-402. Elementary Chinese
Aural-oral practice in meaningful contexts of the fundamental vocabulary and grammar of Mandarin Chinese. Reading and writing in romanization (pinyin) and in Chinese characters. 4 cr.

#503-504. Intermediate Chinese
Continuation of CHIN 401-402. Conducted entirely in Chinese, with work on listening comprehension, speech, reading, and writing of Chinese characters, with increasing attention to reading contemporary Chinese texts. 4 cr.

Civil Engineering (CIE)

(For program description, see page 58.)

Chairperson: Thomas P. Ballestero
Professors: David L. Gress, Otis J. Sproul
Associate Professors: Thomas P. Ballestero, Jean Benoit, Michael R. Collins, Pedro A. de Alba, Charles H. Goodspeed, Robert M. Henry, Nancy E. Kinner, James P. Malley, Paul J. Ossenbruggen
Research Associate Professor: T. Taylor Eighmy
Assistant Professors: Raymond A. Cook, Michael B. Stetson

400. Civil Engineering Lectures
Introduction to the profession; the civil engineer as a planner, builder, and problem solver; and the goals of the civil engineering curriculum. Introduction to concepts of integrated design. Lectures by faculty and visitors. Introduction to word-processing and spreadsheet software. Filed trips to construction sites. Engineering ethics. Required of CIE first-year students; open to others by permission. 1 cr. Cr/F.

505. Surveying
Principles of land measurements by ground and photogrammetric methods. Application of error theory to planning and adjusting engineering surveys. Conformal mapping and its applications to state plane coordinate systems. CIE majors or permission. Coreq: MATH 426 or permission. Lab. 4 cr.

520. Environmental Pollution and Protection—A Global Context
Introduction to environmental science and the anthropogenic causes of environmental change. Emphasis on the causes, effects, and controls of air, water, and land pollution. The ecological, economic, ethical, and engineering aspects of pollution are discussed along with the political (both domestic and international) and legislative aspects of control. 4 cr.

528. Mechanics I
Introduction to statics and particle dynamics and rigid body dynamics. Two- and three-dimensional force systems; the concept of static and dynamic equilibrium; rotational and translational kinetic energy of rigid bodies; friction; momentum and impulse principles; analysis of trusses and beams, centroids, development of moment and shear diagrams. Prereq: MATH 425; MATH 426; PHYS 407. 4 cr.

529. Mechanics II
Introduction to strength of materials, virtual work, work-energy relationships. Analysis of members under bending, torsion, axial loads; diagrams; stresses and strains; stability of columns. Prereq: CIE 528. 4 cr.

530. Introduction to Civil Engineering Applications
Introduction to the solution of civil engineering problems using computer applications; regression analysis, curve fitting, numerical integration, statistics, roots of equations, spreadsheets, databases, CAD, and BASIC. Emphasis on use of computers as an engineering tool, and how to verify results

obtained from a computer analysis. Prereq: CIE 400, CS 410F or 410C, or permission. 3 cr.

622. Engineering Materials
Structural properties and applications of the various materials used in civil engineering projects, including steel, cement, mineral aggregates, concrete, timber, and bituminous materials. Microstructure and properties of common metals, plastics, and ceramics. Prereq: CIE 529; CIE major or permission. Lab 4 cr

630. Civil Engineering CAE Seminar
Lectures and seminars on the fundamentals of computers, hardware, software, applications, and computer management. Prepares students for their senior CAE project. Prereq: CIE 530; permission. 1 cr.

633. Systems Analysis
Techniques for modeling and analysis of engineering systems. Topics include economic evaluation, optimization, system variability and uncertainty, and model calibration. Pre- or coreq MATH 527 and 644; CIE major or permission. 3 cr.

642. Fluid Mechanics
Properties of fluids, fluid statics, continuity, momentum and energy equations, resistance to flow, flow in open channels and piping systems, dimensional analysis, similitude, drag, and lift. Laboratory exercises on measurement of fluid properties, flow resistance, discharge measurement, momentum, hydropower, groundwater flow, and settling of spheres. Prereq: CIE 528, 529; CIE major or permission. Lab. 4 cr.

645. Fundamental Aspects of Environmental Engineering
Application of fundamental concepts of mass balance in treatment processes. Physical, chemical, and biological aspects of pollution control, and design concepts for operations and processes used in environmental engineering are discussed Concepts of engineering ethics are presented. Prereq: CHEM 403-404; MATH 425, 426; CIE major or permission. 4 cr.

665. Soil Mechanics
Soil classification and physical properties. Permeability, compressibility, bearing capacity, settlement, and shearing resistance are related to the behavior of soils subjected to various loading conditions. Coreq: CIE 642; CIE major or permission. Lab. 4 cr.

681. Classical Structural Analysis
Analytical stress and deflection analysis of determinate and indeterminate structures under static and moving load by classical methods. Prereq: CIE 528-529; CIE major or permission. 3 cr

#695. Civil Engineering Projects
Independent research, under faculty guidance, of a subject of particular interest to an individual or a small group. Prereq: approval of faculty member involved 2–4 cr.

721. Pavement Design
Flexible and rigid pavements and bases for highways, airports, and city streets; pavement selection, construction methods, materials, specifications, and engineering cost estimates. Prereq: CIE 665 or permission. 3 cr.

#722. Properties and Production of Concrete
Basic principles of hydraulic cements and mineral aggregates, and their interactions in the properties of plastic and hardened concrete; modifications through admixtures; production handling and placement problems; specifications; quality control and acceptance testing; lightweight, heavyweight, and other special concretes. Prereq: CIE 622 or permission. 3 cr.

#723. Bituminous Materials and Mixtures
Considerations of major types of bituminous materials, asphalt cements, cutback asphalts, asphalt emulsions, and tars; influence of chemical composition on physical properties; desirable aggregate characteristics for bituminous mixtures; construction techniques; current practices for determining optimum asphalt contents. Prereq: CIE 622 or permission. 3 cr.

730. Civil Engineering CAE Project
Part lecture and part independent study. Lectures help the student bring together the materials of all CIE courses taken and focus that information on the senior computer project. Prereq: CIE 530; CIE 630. 3 cr.

734. System Analysis II
Methods of analysis for decision making used in the planning, design, and management of various engineering systems involving chance and uncertainty. Topics in applied probability and statistics are used for risk analysis and for investigating system performance and reliability. Prereq: CIE 633, MATH 644, or permission. 3 cr.

739. Industrial Wastewater Treatment
Design consideration of the origin, characteristics, and treatment of industrial wastewater; the theory and application of unit operations unique to the treatment and disposal of industrial wastes. Prereq: CIE 645 or permission. 3 cr.

#740. Rural Wastewater Engineering
Methods for collecting and treating wastewater in small communities and rural areas. Biological and physicochemical treatment systems for small communities; land application; soil absorption; gray water treatment; and septage treatment. Prereq: CIE 645 or permission. 3 cr.

741. Open Channel Flow
Energy and momentum principles in open channel flow; flow resistance; channel controls and transitions; unsteady open channel flows; and basic modeling techniques using program HEC-2 Prereq: CIE 642 or permission. 3 cr.

742. Hazardous Waste Management
A thorough examination of the hazardous waste management problem in terms of the magnitude of the problem, the regulation of hazardous wastes, hazardous waste treatment and disposal technology, siting requirements, and remedial actions required at uncontrolled dump sites. Prereq: CIE 645 or permission. 3 cr.

743. Environmental Sampling and Analysis
Theory of analytical and sampling techniques used in environmental engineering. Topics include potentiometry, spectroscopy, chromatography, automated analysis, quality control, sampling design, and collection methods. Methods discussed in lecture are demonstrated in labs. Prereq: CHEM 403-404; CIE 645 or permission. Lab. 4 cr.

744. Physicochemical Treatment Design
Selection, design, and evaluation of unit processes employed in physicochemical treatment of waters, wastewaters, and hazardous wastes. Discusses preparation of engineering reports, alternative designs, and economic analysis. Emphasizes treatment schemes based on experimental findings. Prereq: CIE 645 and CIE 749;/ or permission. 3 cr.

745. Engineering Hydrology
Hydrologic cycle, probability theory related to hydrology and the design of water resources structures, water law basics, flood discharge prediction, hydrograph development, hydraulic and hydrologic river routing, reservoir routing, theory of storage, reservoir operations, hydropower development, modeling of watershed hydrology with program HEC-1, multipurpose projects. Prereq: CIE 642 or permission. 3 cr.

746. Biological Treatment Design
Selection, design, and evaluation of unit processes employed in biological treatment of waters, wastewaters, and hazardous wastes. Preparation of engineering reports, including developing design alternatives and economic analysis, is required. Prereq: CIE 645 and CIE 642;/or permission. 3 cr.

747. Introduction to Marine Pollution and Control
Introduction to the sources, effects, and control of pollutants in the marine environment. Dynamic and kinetic modeling; ocean disposal of on-shore wastes, shipboard wastes, solid wastes, dredge spoils, and radioactive wastes; and oil spills. Prereq: CIE 645 or permission. 3 cr.

748. Solid Waste and Residuals Management
Collection, characterization, treatment, and disposal of solid waste and residuals (sludge) from environmental treatment processes. Topics include waste minimization, sludge stabilization, thickening, dewatering, composting, codisposal, landfill design, and incineration. Prereq: CIE 645 or permission. 3 cr.

749. Water Chemistry
Emphasizes the use of chemical equilibrium principles. Theory, calculations, and applications of ionic equilibrium stresses. Topics include thermodynamics, kinetics, acid/base, complexation, precipitation/dissolution, and redox equilibria. Computer equilibrium modeling will be presented. Prereq: general chemistry or equivalent. 4 cr.

753. Marine Pollution at Shoals Marine Laboratory
Effects of pollutants in the marine environment discussed from the perspectives of elementary physical and chemical oceanography and biological processes. Covers sources and effects of marine pollutants; oil spill impact and clean-up procedures; ocean outfall disposal; shipboard wastewater treatment; marine disposal of

sludge, solid waste, and dredge spoils; and radioactive waste disposal. Hands-on lab exercises test both low-level pristine marine water and high-level saline wastewater for chemical and microbial parameters. Conducts dye current studies. Class participates in the continuing assessment of the environmental impact of the Shoals Marine Laboratory domestic sewage system. Field trips to Seabrook nuclear power plant and state of N.H. oil pollution control unit. Daily and evening lectures, labs, and fieldwork. Prereq: Field Marine Science or permission; non-CIE majors. 4 cr.

754. Transportation Engineering and Planning
Fundamental relationships of traffic speed, density, and flow applied to public and private modes of transport. Principles of demand forecasting and urban systems planning. Prereq: permission. 3 cr.

755. Design of Water Transmission Systems
Pressure, sewer, and open channel system design. Theory developed for individual components to large complex systems. Topics include: closed conduit flow, open channel flow, groundwater flow, valves and meters, pump selection, system planning and layout, and system operation and maintenance. Pressure system modeling with program KYPIPES. Rainfall runoff calculations with US SCS TR55 model. Prereq: CIE 642 or permission. 3 cr.

756. Wastewater Microbiology
Concepts of wastewater treatment microbiology. Topics include taxonomy of wastewater species; cellular chemical composition and ultrastructure of sewage microorganisms; microbial metabolism, interaction, and growth kinetics in wastewater treatment; biogeochemical cycling in polluted water; and effects of environmental parameters on wastewater microbial processes. Laboratory projects examine these concepts. Prereq: CIE 645 or permission. Lab. 4 cr.

#757. Coastal Engineering and Processes
Introduction to small amplitude and finite amplitude wave theories. Wave forecasting by significant wave and wave spectrum method. Coastal processes and shoreline protection. Wave forces and wave-structure interaction. Introduction to mathematical and physical modeling. Prereq: CIE 642 or permission. 3 cr.

760. Foundation Design
Foundation design based on subsurface investigation and characterization using current methods of laboratory and in situ testing. Application of consolidation theory and bearing capacity theory for the design of shallow foundations including footings and rafts. Design and analysis of deep foundations including piles, piers, and caissons. Earth pressure theory and design of temporary and permanent retaining structures including retaining walls, sheet-pile walls, and braced, tieback, and nailed walls. Design and analysis of slurry trench cutoffs. Slope stability theory and applications. Introduction to geosynthetics. Prereq: CIE 665 or permission. 4 cr.

762. Introduction to Geotechnical Earthquake Engineering
Overview of earthquake source mechanisms; magnitude and intensity; seismicity of the U.S. Dynamics of simple structures; response spectra. Selection of design parameters; source, magnitude, input records. Measurement of dynamic characteristics of soils; site response, liquefaction, and ground deformation. Prereq: CIE 760 or permission. 3 cr.

763. Geological Engineering
Functional classification of rocks and rock masses. Stereographic projection. Engineering properties of rocks. Rock mechanics. The influence of geology in the design of underground excavations, tunneling, foundations, and rock slope engineering. Prereq: soil mechanics; prin. of geology;/or permission. 3 cr.

765. Soil and Site Improvement
Techniques for improving support and behavior characteristics of soils. Includes in situ reinforcement, densification, reinforcement of constructed earth, and chemical admixtures and grouting. Prereq: CIE 760. 3 cr.

774. Reinforced Concrete Design
Introduction to the design of reinforced concrete structural members by the strength method and deflection performance. Includes beams, columns and foundations, and construction details of reinforcing. Prereq: CIE 681 or permission. 4 cr.

782. Timber Design
Properties and characteristics of structural woods, mechanics of wood, connection methods, design of timber members, and connections in beams, columns, and trusses, and glued laminates of wood. Prereq: CIE 681 or permission. 3 cr.

783. Matrix Structural Analysis
Analysis of determinate and indeterminate structures; nonprismatic members subject to static and moving loads. Solution by matrix and computer-applied methods. Prereq: CIE 681 or permission. 3 cr.

784. Civil Engineering Analysis with Numerical Techniques
Unifying concepts of civil engineering analysis, theory, and numerical techniques. Discussion includes assumptions required by numerical techniques and their relationship to the theory and analytical results. Prereq: permission. 3 cr.

785. Introduction to Structural Vibrations
Dynamic analysis of single- and multi-degree-of-freedom systems. Simple beam and frame structures. Earthquake analysis and design. Co-or prereq: CIE 783. 3 cr.

786. Introduction to Finite Element Analysis
Topics include basic matrix theory, Galerkin method, direct stiffness method, development of finite element theory, and modeling techniques, applications in solid mechanics, heat transfer, fluids, and dynamics using commercially available codes. Prereq: CIE 681; matrix algebra; or permission. 3 cr.

788. Project Planning and Design
Student groups will be formed into design teams to prepare a design plan for a large-scale civil engineering system including consideration of budgetary constraints, building code criteria, and environmental impacts. Each team prepares a final written and oral report. Prereq: senior CIE major or permission. 4 cr.

#791. Prestressed Concrete
Design of prestressed and post-tensioned concrete sections in flexure and shear. Prestressing systems and ultimate strength methods are introduced. Prereq: CIE 774 or permission. 3 cr.

793. Structural Design in Steel
Design of members and connections: tension and compression members, beams, plate girders; riveted, bolted, and welded joints. Introduction to plastic design of beams and frames. Prereq: CIE 681 or permission. 4 cr.

795-796. Independent Study
A limited number of qualified seniors will be permitted to pursue independent studies under faculty guidance. Seniors may write terminal theses reporting the results of their investigations. (May repeat.) 1–4 cr.

Classics (CLAS)

Department of Spanish and Classics
(For program description, see page 26; see also course listings under Greek and Latin.)

Chairperson: John C. Rouman
Professor: John C. Rouman
Associate Professor: Richard V. Desrosiers
Assistant Professors: Richard E. Clairmont, Maria C. Pantelia
Lecturers: Arthur E. Athans, Philip J. Sheridan

#411-412. Elementary Hittite
Elements of grammar, reading of simple prose. 4 cr.

#413-414. Elementary Sanskrit
Elements of grammar, reading of simple prose. 4 cr.

501. Classical Mythology
Survey of the myths and sagas of ancient Greece and Rome. No classical preparation necessary. Background course for majors in English, the arts, music, history, modern languages, classics, etc. 4 cr.

#502. Hellenic and Roman Institutions
Lecture, discussion. Introduction to ancient Greek and Roman literature. Emphasis on the institutions from the earliest period to the end of the classical age. Open to all students. 4 cr.

503. Cicero and the Roman Republic
Introduction to the political background of Cicero's career and study of the role played by the greatest of Roman orators in the constitutional crisis of the last century of the Republic. Open to all students. 4 cr.

#504. The Augustan Principate
A study of the early Roman Empire as created by Augustus and his immediate successors; glorified by Vergil, Horace, and the poets of the Golden Age; and described by Tacitus,

Suetonius, and the prose writers of the Silver Age. Open to all students. 4 cr.

506. Introduction to Comparative and Historical Linguistics
Major language families (primarily Indo-European) and the relationships among languages within a family. Diachronic studies; methods of writing; linguistic change; glottochronology; etymological studies. Some language training and LING 505 desirable. (Also offered as LING 506.) 4 cr.

511. Major Greek Authors in English
Major classical authors such as Homer, the Tragedians of Athens, Herodotus, Thucydides, and Plato in the context of their civilization, from which so much of our contemporary culture derives. For students unprepared to read Greek. Background for majors in English, history, Latin, Greek, the arts, music, philosophy, modern languages, etc. Open to all students. 4 cr.

512. Major Roman Authors in English
Major classical authors such as Plautus, Terence, Cicero, Catullus, Vergil, Ovid, Seneca, Juvenal, and Tacitus in the context of their civilization, from which so much of our contemporary culture derives. For students unprepared to read Latin. Background for majors in English, philosophy, history, Latin, Greek, the arts, music, modern languages, etc. Open to all students. 4 cr.

#521, 522. Masterpieces of Greco-Roman Culture in English
More advanced study of the writings of classical civilization centered on a single theme and taught in the Socratic method. For students with some classical preparation, although no knowledge of the Greek and Latin languages is required. Background for prelaw students as well as majors in English, history, Latin, Greek, modern languages, and political science. 4 cr.

525. Greek and Latin Origins of Medical Terms
Study of medical terminology. Exercises in etymology and the development of vocabulary in a context at once scientific, historical, and cultural. No knowledge of Greek or Latin is required. Useful to premedical, predental, preveterinary, nursing, medical technology, and other students in the biological and physical sciences. Open to all students. 4 cr.

#595, 596. Topics in Classics
Introduction and elementary study related to linguistic study of Latin and Greek or relevant to Greco-Roman culture and history. Primarily for students unprepared to read Latin and Greek. Topics: A) Byzantine Heritage; B) Grammar: Comparative Study of English and the Classical Languages; C) Greek and Latin Origins of Legal Terms; D) Greek and Latin Origins within the English Language; E) Classical Backgrounds of Modern Literature; F) Classical Archaeology. 4 cr.

695, 696. Special Studies in Classics
Advanced work in classics. Research paper. Not open to freshmen and sophomores. 2 or 4 cr.

Communication (CMN)

(For program description, see page 26.)

Chairperson: Sheila McNamee
Professor: Joshua Meyrowitz, Barbara M. Montgomery, John D. Shotter
Associate Professors: Beverly James, John Lannamann, Sheila McNamee, Lawrence J. Prelli
Assistant Professors: Patrick J. Daley, John N. Erni, James M. Farrell, Lynn M. Stearney, Marietta M. Tonn
Faculty-in-Residence, Assistant Professors: Mark S. Kuhn, Julie H. Weiss
Lecturer: Amy R. Chartoff

402. Communication and Social Order
Introduction to human communication from a broad liberal arts perspective; emphasizing the role of symbolic interaction in the construction of social reality. Processes of intrapersonal, interpersonal, group, public, and mass communication. Freshman, sophomore priority. 4 cr.

455. Introduction to Mass Communication
Nature, development, and effects of mass media. Overview of mass communication history and theory. 4 cr.

456. Propaganda and Persuasion
Introduction to theories of propaganda and persuasion. Examination of symbolic strategies designed to secure or resist social and institutional change. Attention given to case studies of social, political, economic, and religious reformation. Special consideration of the ethical ramifications of such efforts. 4 cr.

457. Introduction to Interpersonal Communication
Research and theory that define the area of interpersonal communication. Examination of the associations between communication and such social phenomena as self-concept, social attraction, relationship development, and health. 4 cr.

500. Public Speaking
Performance course buttressed by practical theories of public discourse. Focus on analysis of speaking situations and audiences, message construction, presentation, and critical evaluation. Does not count for credit towards the CMN major. 4 cr.

503. Introduction to Group Process
Focuses on a variety of concepts relevant to the study, analysis, and understanding of communication in the small group setting. Issues include leadership, group roles, problem-solving and decision-making processes in task-oriented groups. Prereq: CMN 457. 4 cr.

504. Introduction to Argumentation
Persuasive discourse as inquiry and advocacy grounded in practical inductive and deductive reasoning. Discovery, analysis, and testing of practical arguments. The nature and function of proof. Some emphasis on applied presentation. Prereq: CMN 456. 4 cr.

505. Analysis of Popular Culture
Locates the development of popular cultural artifacts and practices within the 20th-century social history of the U.S. Examines the political-economic forces that underpinned the commercialization of art, leisure, sports, and other elements of culture in industrial and post-industrial America. Prereq: CMN 455. 4 cr.

506. Communication as Social Influence
Examines cognitive and social bases of persuasion and social influence from a variety of theoretical perspectives. Focuses on processes of change as applied to face-to-face interaction, group and family settings, and mediated communication. Prereq: CMN 457. 4 cr.

507. Introduction to Rhetorical Theory and Analysis
Major precepts of rhetorical theory. Application of those precepts in analysis and understanding of a wide range of human communication. Consideration of how precepts and issues of rhetorical theory apply to contemporary issues and problems. Prereq: CMN 456. 4 cr.

515. Analysis of News
Explores the psychological, social, economic, political, and cultural factors that influence the definition and reporting of news. Prereq: CMN 455. 4 cr.

519. Advertising as Social Communication
Social role of advertising, public policy debates concerning advertising, influence of advertising on culture, and methods of analyzing advertising messages. Prereq: CMN 455. 4 cr.

530. Family Communication
Comparison and evaluation of theories of communication developed for the analysis of family interaction. Focus on pattern development and intervention, change, stability, and coherence in family interaction. Prereq: CMN 457. 4 cr.

533. Introduction to Film
The art, history, technology, and theory of the narrative motion picture from the silent period to the present. Examination of films by such filmmakers as Griffith, Keaton, Eisenstein, Renoir, Welles, Hitchcock, Bergman, Kurosawa. (Also offered as ENGL 533; communication majors must register for CMN 533.) Prereq: CMN 455. 4 cr.

557. Great Speakers and Speeches
Historical survey of masterpieces of oratory from the period of Demosthenes and Cicero through the golden age of American oratory with Lincoln and Webster, to the time of Martin Luther King, John Kennedy, and Ronald Reagan. Critical attention to the circumstances, talents, and rhetorical attributes that combine to make eloquent, persuasive discourse and effective public communication. Prereq: CMN 456. 4 cr.

567. Images of Gender in the Media
The symbolic construction of sexuality and gender in specific social, historical, and cultural settings. Examination of the power to define media images and its function as one element in the preservation of gender inequality. Prereq: CMN 455. 4 cr.

572. Language and Behavior
Focus on language and how a person's, group's, society's, and culture's uses of language are associated with different behavioral patterns and world views. Topics include the relationship of language to social standing, race, minority group membership, gender, and stereotyping. Prereq: CMN 457. 4 cr.

583. Gender and Expression
Analysis of the different ways people communicate about gender, the different ways men and women communicate, and the consequences of these differences. Prereq: CMN 457. 4 cr.

596. Special Topics in Media Studies
Selected topics not covered by existing courses in media studies. Topics vary; course descriptions are available in department office during preregistration. May be repeated for credit if topics differ. Prereq: CMN 455. 2 cr.

597. Special Topics in Rhetorical Studies
Selected topics not covered by existing courses in rhetorical studies. Topics vary; course descriptions are available in department office during preregistration. May be repeated for credit if topics differ. Prereq: CMN 456. 4 cr.

598. Special Topics in Interpersonal Studies
Selected topics not covered by existing courses in interpersonal communication. Topics vary; course descriptions are available in department office during preregistration. May be repeated for credit if topics differ. Prereq: CMN 457. 4 cr.

602. Theories of Interpersonal Communication
Analysis and criticism of contemporary perspectives on interpersonal communication. Theories, concepts, issues, and research models are examined as they contribute to our understanding of social interaction. Prereq: any CMN 500-level interpersonal studies course or permission. 4 cr.

#604. Public Argument in Contemporary Society
Studies of inquiry and advocacy within such contemporary fields as law, politics, science, ethics, business, and the arts. Prereq: any 500-level rhetorical studies course or permission. 4 cr.

605. Argumentation and Public Advocacy
Ideas and methods of adversarial and consensual public advocacy. Applied emphasis on public policy argumentation and decision making. Prereq: any 500-level rhetorical studies course; CMN 500 or 504 recommended. 4 cr.

607. Persuasion in American Politics
Study of the forms and strategies of persuasive discourse employed by contemporary American political leaders. Analysis of important political addresses of the 20th century, with attention to theoretical and critical issues in political communication and public address. Discussion of the status of rhetoric in modern politics, and the impact of persuasive discourse on campaigns, policy decisions, crisis management, political scandal, and the national identity. Prereq: any 500-level rhetorical studies course or permission. 4 cr.

615. Public Opinion and Mass Communication
Examines the historical development of the 18th-century public sphere and its relationship to the press. Traces the transformation of the press from an ideological grounding to a commercial base. Analyzes the consequences of contemporary mass consumer-oriented media on the public sphere and democratic life. Prereq: any 500-level media studies course. 4 cr.

616. Studies in Film
Advanced, focused study of the cinema. Topics vary from year to year and with instructor. Focus may range from general considerations of film theory, film criticism, and film history, to specific analyses of selected genres, directors, and periods. Course descriptions available in department office during preregistration. (Also offered as ENGL 616; CMN majors must register for CMN 616.) Prereq: CMN/ENGL 533 or permission. Special fee. 4 cr.

630. Psychology of Communication
Exploration of differing world views in the study of the individual in interaction, with emphasis on how they generate very different conceptions of the human communication process. Specific attention to such notions as the construction of social meaning, the construction of self, and the construction of interactive patterns. Prereq: any 500-level interpersonal studies course or permission. 4 cr.

632. Communication Theory
Terminology, concepts, theoretical models, functions, levels, modes and media, and role taking in human communication. Prereq: any 500-level CMN course (three 500-level courses recommended) or permission. 4 cr.

638. Media and Social Thought
Situates the development of media, public attitudes toward media, and academic study of media within late 19th- and 20th-century social theories, including mass society theory, functionalism-pluralism, and European critical theories. Traces the fragmentation of 19th-century social philosophy into discrete specialized academic disciplines in the 20th century, and discovers the roots of modern media studies in such cognate fields as sociology, psychology, anthropology, and linguistics. Prereq: any 500-level media studies course or permission. 4 cr.

640. Media, Culture, and Society
Focuses on the construction of meaning in the interplay between social structure and cultural expression. Theory and analysis emphasize the ideological role of the media in the social struggle for meaning. Prereq: any 500-level media studies course or permission. 4 cr.

647. The Rhetoric of Science
Employs rhetorical analysis to examine how science is socially constructed through communication. Investigates persuasive strategies writers and speakers employ to gain approval of ideas as "science" and of themselves as "scientists." Explores strategies used to construct images and ideas about "science" and "scientists" in the popular media, and the influence of these constructed images and ideas on selected political and social issues within society at large. Prereq: any 500-level rhetoric course or permission. 4 cr. Cr/F.

656. Principles of Rhetorical Criticism
Application of critical principles to message evaluation. Consideration of the varying roles, methods, and standards of rhetorical critics. Special attention to major perspectives on rhetorical criticism including neo-Aristotelian, historical, dramatistic, generic, literary, and psychological. Prereq: any 500-level rhetorical studies course (CMN 507 recommended). 4 cr.

657. Public Address and the American Experience
Study of persuasive texts set firmly in their historical and social contexts. Discussion of the impact of popular discourse on historically significant political and social events. Analysis of how leading persuasive speakers and writers responded to the fundamental questions confronting their age and articulated ideas in a manner that provoked or motivated their community, state, or nation. Historical period studied will vary. Prereq: 500-level rhetorical studies course or permission. May be repeated for credit when topic varies. 4 cr.

658. Media Analysis and Criticism
Approaches and methodologies for media criticism. Analysis of sample studies. Students work on original media analysis projects. Prereq: any two 500-level CMN courses (three 500-level courses recommended) or permission. 4 cr.

#670. Systems and Theories of Rhetoric
Critical interpretation of significant works in the history of rhetorical theory and the major philosophical systems underlying them. Selected contemporary theories of rhetoric examined as they relate to classical perspectives. Explores fundamental philosophical and theoretical questions asked by rhetorical theorists and several responses to those questions. Prereq: any 500-level rhetorical studies course (CMN 597 recommended). 4 cr.

672. Theories of Language and Discourse
Focus on different theoretical orientations to the study of language and specific models for analyzing conversation. Specific issues include conversational rules and coherence, turn taking, narrative development and analysis, speech act analysis, accounts analysis, and conversational analysis. Prereq: any 500-level interpersonal studies course (CMN 572 recommended) or permission. 4 cr.

680. Perspectives on Culture and Communication
Theoretical and practical problems of intercultural communication. Explores how communication transactions create, maintain, and separate different cultures. Prereq: any 500-level interpersonal studies course or permission. 4 cr.

696. Communication Seminar in Media Studies
Variable topics in media research, theory, and practice. May be repeated for different topics. Topic descriptions available in department office during preregistration. Prereq: any 500-level media studies course or permission. 4 cr.

697. Communication Seminar in Rhetorical Studies
Variable topics in rhetorical research, theory, and practice. May be repeated for different topics. Topic descriptions available in department office during preregistration. Prereq: any 500-level rhetorical studies course or permission. 4 cr.

698. Communication Seminar in Interpersonal Studies
Variable topics in interpersonal research, theory, and practice. May be repeated for different topics. Topic descriptions available in department office during preregistration. Prereq: any 500-level interpersonal studies course or permission. 4 cr.

701. Modes of Communication Inquiry
Overview of selected philosophical orientations, issues, and concepts central to communication research. Examination of both qualitative and quantitative methods. Prereq: two 500-level CMN courses or permission. 4 cr.

702. Seminar in Interpersonal Communication Theory
In-depth concentration on a particular theoretical orientation in interpersonal communication. Original works are read. Theoretical orientation varies by semester. Theories covered include rule theories, systems theories, individual difference theories, symbolic interactionism, constructivism, hermeneutics, phenomenology, cybernetics, etc. Prereq: three 500-level CMN courses with at least one in interpersonal studies or permission. 4 cr.

#703. Seminar in Rhetorical Theory
Focused study of problems in rhetorical theory construction through examination and criticism of selected theoretical frameworks used to explain or interpret rhetorical phenomena. Prereq: permission. 4 cr.

#772. Seminar in Media Theory
Detailed analysis of major theories related to the interaction of communication technologies and society. Application to current examples in politics, advertising, and entertainment. Prereq: at least one 600-level course or permission. 4 cr.

795. Independent Study
Advanced individual study in rhetoric, media, or interpersonal communication. Project to be developed with supervising instructor. May be repeated for credit. Prereq: permission. Variable to 4 cr.

799H. Honors Thesis
Written thesis based on substantial and original research under the direction of a full-time member of the communication faculty. Thesis must be in the form and style of a publishable, scholarly work. Restricted to seniors seeking honors in major. 4 cr.

Communication Disorders (COMM)

(For program description, see page 68.)

Chairperson: Frederick C. Lewis
Professor: Stephen N. Calculator
Associate Professors: Steven P. Bornstein, Frederick C. Lewis
Adjunct Associate Professors: Linda Hanrahan, Frederick P. Murray
Assistant Professors: Susan Dietrich, Penelope E. Webster
Adjunct Assistant Professors: Sheryl Gottwald, Richard Guare, Mark R. Hammond, Karen Lucas, Lygia Soares
Instructor: Amy S. Plante
Clinical Supervisor: Allison Murray

520. Survey of Communication Disorders
Causes, diagnosis, and treatment of speech, language, and hearing disorders. 4 cr.

521. Anatomy and Physiology of the Speech and Hearing Mechanisms
Anatomy, physiology, neurology, and function of the mechanisms for the production and perception of speech. 4 cr.

522. The Acquisition of Language
Review of research and theories in speech education, linguistics, and learning theory related to development of language in the normal child. 4 cr.

523. Clinic Observation
Formal observation of diagnosis and therapy being conducted for individuals with a variety of communication disorders. Prereq: COMM 520. 1 cr. Cr/F.

524. Applied Phonetics
Application of the International Phonetic Alphabet to normal and clinical populations; use of broad and narrow transcriptions. Basic speech science, acoustic phonetics, and acoustic analysis of speech production. 4 cr.

630. Organic Pathologies
Neurological bases, diagnosis, and treatment of communication disorders; emphasis on motor speech disorders and aphasia. Prereq: permission. 4 cr.

631. Articulation and Language Disorders in Children
Research, diagnosis, and therapy procedures as applied to articulation and language disorders. 4 cr.

633. American Sign Language I
Introduction to the vocabulary, finger spelling, and grammatical processes of American Sign Language. Emphasis on applying basic principles of sign language, psychosocial aspects of deafness, and the deaf person as bilingual. Prereq: permission. 2 cr.

634. Introduction to Clinical Procedures
Clinical procedures and client management Treatment techniques for disorders of articulation and language. Parent interview and counseling, facilitating target behaviors, and report writing. History requirements and governance of the profession. Prereq: COMM 631. 4 cr.

660. Special Problems in Communication Disorders
Individual or group projects to enrich or expand theoretical knowledge and to afford an opportunity for applied experience. Prereq: permission and arrangement with faculty. May be repeated to a maximum of 8 credits. 2, 4, 6, or 8 cr.

700. American Sign Language II
Advanced phonology, syntax, and semantics of American Sign Language. Emphasis on grammatical processes that modulate meaning of signs in discourse and development of receptive language skills. Prereq: COMM 633 and permission. 2 cr.

702. American Sign Language III
Emphasis on the advanced linguistic principles of American Sign Language including idioms, slang, and their place in the communication patterns of the deaf. Improvement of speed and accuracy in receptive and expressive skills for communicating with the deaf. Educational and vocational problems associated with deafness. Prereq: permission. 2 cr.

704. Basic Audiology
Normal hearing process and pathologies of the auditory system. Hearing screening, pure-tone testing, and speech audiometry. Prereq: COMM 521 or permission. 4 cr.

705. Introduction to Auditory Perception and Aural Rehabilitation
Research, testing, and clinical procedures of auditory perception, applied to the communicatively impaired. Prereq: COMM 704; permission. 4 cr.

777. Speech and Hearing Science
Physical, acoustical, and perceptual correlates of normal speech production and audition. Includes theoretical models along with the generation, transmission, detection, and analysis of speech signals. 3 cr.

780. Diagnosis of Speech and Language Disorders
Principles and practice for diagnosis of speech and language disorders; examination procedures and measurement techniques. Prereq: COMM 630 (or 632). 4 cr.

795. Independent Study
Application of the theory to specific communication disorder areas for individual or group projects. Prereq: permission. May be repeated to a maximum of 8 credits. 2, 4, 6, or 8 cr.

Community Development (CD)

Department of Resource Economics and Development
(For program description, see page 44.)

Chairperson: Bruce E. Lindsay
Coordinator: Edmund F. Jansen, Jr
Professors: Edmund F. Jansen, Jr., Bruce E. Lindsay
Associate Professors: John M. Halstead, Douglas E. Morris
Assistant Professor: Robert A. Robertson
Adjunct Assistant Professor: Lynda Brushett
Extension Educator: Gerald W. Howe

415. Community Issues and Perspectives
Introduction of the concept of community and issues that are facing contemporary communities as they undergo change. Investigations of the required components for a successful community and the role and responsibilities of professional administrators and individual citizens in the dynamic process of community policy formulation, decision making, and administrative implementation. 4 cr.

508. Applied Community Development
Students work in an actual community, assisting individuals and groups to identify needs and problems, establish attainable and objective goals, assess requirements and resources, and formulate programs for development; methods of collection, analysis and integration of pertinent primary and secondary economic, social, political, and physical data for community development. Prereq: CD 415 or permission. Lab. 4 cr.

#531. Fundamentals of Real Estate
Examination of title and legal processes involved in the acquisition and sale of real estate, including real estate rights, limitations and restrictions of rights, contracts and agreements, transferring property, types of deeds, financing the purchase of real estate, the closing statement, real estate law and ethics, and estimating real estate value. 3 cr.

#532. Real Estate Appraisal
Intensive study of the principles of residential and commercial appraising. Topics include influences affecting value, the three approaches to value, principles of land and building analysis, building cost estimation, and the causes and effects of depreciation. Prereq: RECO 411 and CD 531 or RECO 606 or permission. Special fee. 4 cr.

#535. Real Estate Law
Fundamentals of real estate law; nature and classes of property; ownership; purchase and sales; and the rights, duties, and responsibilities of the broker. Prereq: CD 531 or permission. 3 cr.

#536. Real Estate Finance
Types and sources of funding for residential and commercial property. Financial evaluation of loan proposals, mortgage processing, and loan management and servicing. Prereq: CD 531 or permission. 3 cr.

607. Community Administration and Development
Principal theories and methods of community administration and development; skills required for professional and citizen volunteers who are involved in decision making and administrative activities in local communities. Emphasis on the responsibilities and strategies of individuals working in the field of local public administration. Prereq: CD 415 or permission. 4 cr.

614. Community Planning
Community planning process in nonmetropolitan communities; practical application of planning techniques. Community components: housing, jobs, schools, recreation, transportation, community appearance, and the administrative structure for planning. Use of planning tools: data gathering and analysis, the master plan, zoning and subdivision regulations, community development programs. Prereq: RECO 411; CD 415;/or permission. 4 cr. (Not offered every year.)

627. Community Economics and Finance
Economic and financial factors affecting community and local government decisions. Emphasis on use of economic theory and analytical techniques to evaluate problems in contemporary New England communities and towns. Prereq: RECO 411 or ECON 402. (Also offered as RECO 627.) 4 cr. (Offered every third semester.)

#710. Community Development Seminar
Seminars arranged to students' needs and offered as demand warrants: in-depth treatment of area, including classic works. May be repeated. 2–4 cr.

717. Law of Community Planning
Common law and the Constitution with respect to property law, including eminent domain, land-use planning, urban renewal, and zoning. Makes the nonlawyer aware of the influence and operation of the legal system in community development. 4 cr.

777. Fundamentals and Practice of Community Planning
Advanced treatment of the concepts and tools required for effective local and regional planning to guide land use, capital investment in infrastructure, and organization for service delivery. Prereq: CD 614 or permission. 4 cr.

#791. Community Administration Seminar
Special topics in community administration. Covers material not normally covered in the regular courses on current issues of major importance. Prereq: permission. 1–4 cr.

#792. Community Planning Seminar
Special topics in community and regional planning. Covers material not normally covered in the regular planning courses or current planning issues of major importance. Prereq: permission. 1–4 cr.

793. Community Administration Internship
Fieldwork in governmental agency or a local government unit for on-the-job skill development. Normally supervised by a qualified administrator in the organization with frequent consultation with a faculty sponsor. A written report is required. Internship may be part- or full-time with course credits assigned accordingly. Prereq: permission. 1–8 cr.

794. Community Planning Internship
Fieldwork in a public planning office or agency for on-the-job skill development. Normally supervised by a qualified planner in the planning organization with frequent consultation with a faculty sponsor. A written report is required. Internship may be part- or full-time with course credits assigned accordingly. Prereq: permission. 1–8 cr.

795, 796. Investigations in Community Development
Special assignments in readings, investigations, or field problems. May be repeated. Prereq: permission. 2–4 cr.

Computer Engineering

(See Electrical and Computer Engineering.)

Computer Science (CS)

(For program description, see page 58.)

Chairperson: T. M. Sparr
Professors: R. Daniel Bergeron, Eugene C. Freuder, Shan S. Kuo, T. M. Sparr
Visiting Professor: Andrew V. Royappa
Associate Professors: Philip John Hatcher, Robert D. Russell, James L. Weiner
Adjunct Associate Professor: Sylvia Weber Russell
Assistant Professors: Pilar de la Torre, Raymond Greenlaw, Elise H. Turner
Research Assistant Professor: Roy M. Turner
Instructors: Charles D. Elfe, Brian L. Johnson, Daniel J. Lickly
Skills Application Teacher: Israel J. Yost

401. Computer Applications
Use of computers to manage and analyze information across a variety of settings and disciplines. Introduction to major categories of software for large and small computer systems and discussion of the computer's role in today's society. No prior computer experience required. Not open to students who have completed DCE 491 or 492. CEPS students should check with their major department for approval. Special fee. 4 cr.

406. Introduction to Computers and Programming
Introduces computers, computer systems, and their applications, with emphasis on the concepts and techniques of computer programming using several programming languages. Intended primarily for liberal arts and other nontechnical students who plan no further study in computer science. Requires skills in reasoning and

systematic problem solving. Significant out-of-class programming required. Not open to CS majors. 4 cr.

410. Introduction to Scientific Programming
Introduction to the concepts and techniques of computer programming. Particular emphasis on computer programming as a problem-solving technique in science and engineering applications. A computer language is taught and used for assignments. Good programming style is stressed. Significant out-of-class programming required. The specific language varies from section to section. Offered in the following languages: C) C; F)FORTRAN. Prereq: MATH 425, or taken concurrently. 4 cr.

412. Introduction to Computer Programming with C
Introduction to the concepts and techniques of computer programming including strings, lists, stacks, and queues. Teaches the C language including features for recursion, address manipulation, file handling, and data abstraction. Emphasis on good programming style. Significant out-of-class programming required. 4 cr.

415-416. Introduction to Computer Science I and II
Theory and practice of computer science. Algorithm development and analysis; data abstraction techniques; elementary data structures; programming with imperative languages, functional languages, and logic programming languages. Computer systems and applications. Intended for CS majors. 4 cr.

505. Applications Programming
Concepts and techniques used in the development of professional quality applications programs for microcomputers. Emphasis on DOS batch files, spreadsheet macros, and database programming. Introduces state-of-the-art applications development tools for Apple Macintosh and PC-compatible computers. Prereq: CS 401 (or 495), CS 406, or CS 410. CEPS students should check with their major department for approval. Special fee. 4 cr.

515. Data Structures
Review of basic data structures; advanced data structures such as graphs, B-trees, and AVL trees; abstract data structure design and programming techniques, use of a data abstraction language. Introduction to algorithm analysis. Prereq: CS 416. 4 cr.

610. Operating System Fundamentals
Introduction to operating system concepts and design. Job, process, and resource management; I/O programming; file systems; interprocess communication. Prereq: CS 410C or 412 or 416; and CS 611 or EE 612. 4 cr.

611. Assembly Language Programming and Machine Organization
Assembly language programming and machine organization: program and data representation; registers, instructions, and addressing modes; assemblers and linkers. Impact of hardware on software and software on hardware. Historical perspectives. Prereq. CS 410C or 412 or 416. 4 cr.

658. Analysis of Algorithms
Introduction to use of basic mathematics in design and analysis of computer algorithms. Topics include O-notation, divide and conquer, the greedy method, dynamic programming, and NP-completeness. Prereq: MATH 531 and 532; CS 515. 4 cr.

659. Introduction to the Theory of Computation
Review of sets, relations, and languages. Induction and diagonalization. Finite automata, context-free languages, pushdown automata. Basic complexity theory. Prereq: MATH 531 and 532; CS 515. 4 cr.

671. Programming Language Concepts and Features
Concepts of programming languages illustrated through comparison and use of various languages. Formal definition of programming languages; specification of syntax and semantics. Properties of algorithmic languages, data abstraction languages and special purpose languages for list processing and symbol manipulation; run-time representation of program and data structures. Prereq: CS 515. 4 cr.

696. Independent Study
Individual projects developed and conducted under the supervision of a faculty member. May be repeated for credit. Prereq: permission of faculty supervisor and department chairperson. 1–6 cr.

712. Compiler Design
Formal languages and formal techniques for syntax analysis and parsing; organization of the compiler and its data structures; problems presented by error recovery and code generation. Classical top-down and bottom-up techniques currently in widespread use, general discussion of LL(k) and LR(k) parsers; automatic methods of compiler generation and compiler compilers. Students required to define a simple, nontrivial programming language and to design and implement its compiler. Pre- or coreq: CS 671. 4 cr.

718. Software Engineering
Design approaches, implementation methodologies, and management techniques required to develop large, reliable software systems, including applications-oriented systems. Team programming projects. Prereq: CS 515 or permission. 4 cr.

719. Object-Oriented Methodology
Object-oriented system design and programming. Languages for object-oriented programming. Prereq: CS 515 or permission. 4 cr.

720. Operating System Concepts
Theory and practice of building operating systems. In-depth investigation of operating system concepts and design. Developments from current operating systems (e.g., UNIX, VMS, etc.). Prereq: CS 610. 4 cr.

722. Advanced Systems Programming
Topics in systems programming, including organization and implementation of assemblers, editors, job schedulers, command language decoders, and file systems. Prereq: CS 610. 4 cr.

727. Computer Communications Software Design
Telecommunications software; error detection algorithms; asynchronous and synchronous communications software; network architectures; protocol definition and implementation; links through a local area network; timing considerations. Selected communications software will be implemented. Prereq: CS 610. 4 cr.

730. Introduction to Artificial Intelligence
Machine intelligence, representation and control issues, search methods, problem solving, learning, computer vision, natural language understanding, knowledge engineering, game playing. Heuristic programming and the LISP language. Prereq: CS 515. 4 cr.

746. Introduction to Programming Semantics
Informal, nonmathematical introduction to descriptive techniques of denotational semantics. Provides framework needed to describe formally programming languages such as PASCAL. No previous knowledge of the theory of computation or of any particular programming language is assumed. Prereq: CS seniors only or instructor's permission. 4 cr.

753. Numerical Methods and Computers
Use of scientific subroutine and plotter routine packages, floating point arithmetic, polynomial and cubic spline interpolation, implementation problems for linear and nonlinear equations, random numbers and Monte Carlo method, Romberg's method, optimization techniques, finite elements. Selected algorithms programmed for computer solution. Prereq: MATH 426; CS 410C, 412, or 610. (Also offered as MATH 753.) 4 cr.

754. Introduction to Scientific Computing
Introduction of the tools and methodology of scientific computing via the examination of interdisciplinary case studies from science and engineering. Emphasis on numerical approaches to solving linear systems, eigenvalue-eigenvector problems, and differential equations. Problems are solved on various hardware platforms using a combination of software and data visualization packages. Prereq: MATH 425; MATH 426; CS 410, 412, or 416; MATH 527 or 645 or permission. (Also offered as MATH 754.) 4 cr.

765. Introduction to Computer Linguistics
Introduction to computational analysis of natural language with a focus on semantic representations and the resolution of ambiguity. Provides an elementary working knowledge of linguistic and artificial intelligence analysis methods as motivated by examples of potential input texts. Topics include parsing, formal grammars, representation of knowledge and memory, inference, and interpretation of nonliteral language. Prereq: elementary knowledge of LISP or instructor's permission. 4 cr.

770. Computer Graphics
Input-output and representation of pictures from hardware and software points of view; interactive techniques and their applications; three-dimensional image synthesis techniques. Prereq: CS 515. 4 cr.

775. Database Techniques
Database analysis and design. Hierarchic, network, and relational models. Data normalization, data manipulation tools, data description languages, query functions and facilities, design and translation strategies, file and index organizations, data integrity and reliability, data security techniques, distributed database systems, actual usage of selected DBMS on computers. Prereq: CS 515 and 610; MATH 531. 4 cr.

780. Topics in Computer Science
Material not normally covered in regular course offerings. May be repeated for credit. 4 cr.

Dance (DANC)

Department of Theatre and Dance
(For program description, see page 36; for faculty listing, see page 186; see also course listings under Theatre.)

441. Exploring Theatrical Process
Develops the idea that drama is the revelation of character through action. Explores the myriad connections between theatre and the life it imitates, concentrating on gesture, movement, speech, and other forms of behavior as manifestations of character on and off the stage. Examines in depth diverse approaches to the verbal and nonverbal revelations of human personality. (Also offered as THEA 441.) 4 cr.

461. Modern Dance I
Introductory course that includes techniques and improvisation as well as lectures in history and theory. Not open to seniors. 4 cr.

462. Ballet I
Introductory course: technique; historical development of ballet. Not open to seniors. 4 cr.

463. Theatre Dance I
Introductory course: techniques; improvisation; lectures on jazz, ethnic, and other theatrical dance forms. Not open to seniors. 4 cr.

#470. Theatre Movement
Stage movement for actors. 2 cr.

487. The Dance
Historical and philosophical consideration of dance trends. Not a performance course. 4 cr.

561. Modern Dance II
Intermediate-level course that includes techniques and improvisation. Prereq: DANC 461. May be repeated for credit. 2 cr.

562. Ballet II
Extension of Ballet I syllabus; emphasis is on technique, with additional step vocabulary. Prereq: DANC 462 or permission. May be repeated once for credit. 2 cr.

563. Theatre Dance II
Technique; African-Cuban, modern, and East Indian dance; body movement through exercise and combinations involving stretch, strength, and flexibility. Prereq: DANC 463. May be repeated once for credit. 2 cr.

576. Pointe
Beginning/advanced beginning course in art of dancing in toe shoes. Focus on technique involved in gaining strength and on methodology for understanding the art of the ballerina. 2 cr.

597. Dance Theatre Performance
Designed for students participating in UNH Dance Theatre Company. Skill development through rehearsal and actual performance experience. 2 cr. Cr/F.

633. Dance Composition I
Practical, developmental approach to process of creating dances. Prereq: DANC 561, 562, 563, or permission. 2 cr.

634. Dance Composition II
Use of music; group choreography. Prereq: DANC 633. 2 cr.

640. Labanotation
Study and practice of recording human movement by the method of Labanotation. 2–4 cr.

661. Modern Dance III
Advanced-level course in technique and composition. Prereq: DANC 561. May be repeated for credit. 2 cr.

662. Ballet III
Advanced-level course in technique; pointe work included. Prereq: DANC 562 or permission. May be repeated for credit. 2 cr.

663. Theatre Dance III
Extension of Theatre Dance I and II; brings students to a more advanced technical level. Prereq: Theatre Dance I and II. May be repeated for credit. 2 cr.

684. Special Topics in Dance
Exploration of topics agreed upon by students and instructor. Topics vary. May be repeated. 2–4 cr.

732. Choreography
Theoretical and practical consideration of the creative and aesthetic aspects of ballet, modern, and theatre dance. 4 cr.

Decision Sciences (DS)

(For program description, see page 79.)

Chairperson: Marvin J. Karson
Professors: Marvin J. Karson, Barry Shore, Linda G. Sprague
Associate Professors: Jinoos A. Hosseini, Richard L. Mills, R. Dan Reid, Jeffrey E. Sohl
Assistant Professors: Roger B. Grinde, A. R. Venkatachalam, Craig H. Wood
Instructor: Peter W. Royce

420. Business Statistics
Introductory coverage of statistical methods for managerial decision making: probability, descriptive and inferential statistics, and regression. Quantitative techniques common to many introductory statistics courses are covered, but the emphasis is on understanding concepts such as uncertainty, inferences from sample data, and model formulation, and on utilizing these techniques as aids in decision making. No credit for students who have had HHS 540, MATH 644, PSYC 402, RECO 528, or SOC 502. 4 cr.

522. Advanced Business Statistics
A second-level course in statistics covering such topics as sample survey design and analysis, experimental design, analysis of variance, nonparametric methods, and GLIM. Prereq: DS 420 or equivalent. 4 cr.

624. Time Series Forecasting
Introduction to modern methods of forecasting from time series data. Exponential smoothing, time series analysis and stationarity, Box-Jenkins analysis, state space model fundamentals, dynamic regression models. Each model methodology includes model identification, estimation, and diagnostic checking. Emphasis on use of the models as forecasting tools. Prereq: DS 420 or equivalent. 4 cr.

625. Statistical Decision Making
Introduction to decision-making theory, including alternatives, criteria, loss functions, and risks. A probabilistic, including Bayesian, approach to decision making under uncertainty. Applications from statistics and management science. Prereq: DS 420. 4 cr.

626. Applied Regression Analysis
Introduction to regression techniques as used in economics and management; estimation and statistical inference in the context of the general linear model; discussion of problems encountered and their solutions; extensions of the general linear model. Prereq: DS 420. (Also offered as ECON 626.) 4 cr.

630. Quantitative Methods
An introduction to quantitative methods and how these methods serve as an input to the decision-making process. The topics covered include linear programming problem formulation and solution, sensitivity analysis, network models, integer programming, goal programming, and forecasting. Prereq: WSBE majors only; all Group A courses and junior standing. 4 cr.

632. Operations Research/Management Science
Review of the basic principles and methods of operations research/management science applied to managerial decision making. Mathematical programming, networks, inventory, queuing, and scheduling. Prereq: permission. 4 cr.

633. Advanced Operations Research/ Management Science
Analysis of complex operations research/management science models and their impact on the decision-making process. Project is undertaken by all students. Advanced mathematical programming (nonlinear, parametric linear, sto-

chastic, and dynamic), stochastic inventory models, heuristic programs, and forecasting. Prereq: DS 630 or DS 632 or permission. 4 cr.

650. Operations Management
Introduction to planning and analysis of operational problems in the manufacturing and service sectors; strategy standards, capacity, inventory, scheduling, and planning and control systems. Prereq: WSBE majors only; all Group A courses and junior standing. 4 cr.

670. Management Information Systems
Provides students with the background necessary to understand, develop, and use computer-based information systems in organizational environments. Topics include information technology, application software, and management of information resources. Prereq: CS 401 (or 495); WSBE majors only; all Group A courses and junior standing. 4 cr.

672. Computer Systems Analysis and Design
Analysis and design of computer systems in administration. Applications in finance, accounting, marketing, and manufacturing. Case studies and projects. Prereq: DS 670. 4 cr.

698. Topics in Decision Sciences
Special topics; may be repeated. Prereq: permission. 4 cr.

754. Production Planning and Control I
Analysis and development of production planning and control systems. Topics include inventory management, material requirements planning, and capacity requirements planning. Prereq: DS 650 or permission. 4 cr.

755. Production Planning and Control II
Analysis and development of production planning and control systems. Topics include production activity control and master planning. Prereq: DS 650 or permission. 4 cr.

758. Strategic Management of Operations
Application of techniques and methodologies in the development of operations strategies. Projects with client firms using operations analysis emphasizing the firms' strategic operations alternatives. Prereq: DS 650 and permission. 4 cr.

772. Decision-Support Systems
Exploration of computer usage in support of the problem-solving and decision-making process. Topics include conceptual foundations of decision-support systems, design of decision-support systems, spreadsheets, databases, and expert systems. Use of mainframe and microcomputers, cases, projects. Prereq: all Group B courses; DS 670; or permission. 4 cr.

798. Topics in Decision Sciences
Special topics; may be repeated. Prereq: permission 4 cr.

Division of Continuing Education (DCE) Career Concentration Courses

(For program description, see page 95.)

Dean, Continuing Education and Summer Session: William F. Murphy

519. Career Planning
Skills and methods of career planning, including integration of career and educational goals. Topics include self-assessment, occupational investigation, occupational selection and decision making, goal setting, and job search techniques. Available to associate degree students, freshmen, and sophomores; others by permission. Special fee. 2 cr.

#599. Special Topics
Occasional course offerings of specialized material in A.A. career concentrations; general studies topics for nontraditional learners; travel/study programs. Prereq: permission. 1–4 cr.

Computer Information Studies

491. Introduction to Computer Information Studies I
Computer components and computer applications. Emphasis on using microcomputers and application software to solve particular problems. Not open to students who have completed CS 401 (or 495). Not open to WSBE majors. 2 cr.

492. Introduction to Computer Information Studies II
Information system concepts and applications, including system comparisons, information processing, networking, telecommunications, ergonomics, and office automation. Laboratory assignments focus on information processing using application software. Prereq: CS 406 or CS 410; DCE 491 or CS 401 (or 495). Not open to WSBE majors. 2 cr.

590. Information Systems Applications
Emphasizes practical experience in using microcomputers for software applications, such as word processing, database management, accounting, decision making, spreadsheets, and business graphics. Students use and adapt/develop software packages. Prereq: DCE 492. Special fee. Not open to WSBE majors. 4 cr.

591. Systems Analysis and Design
Design and implementation of integrated systems such as inventory control or accounting, including topics such as human factors, file creation and maintenance using CRT on-line communications facilities, sorting, and report writing on both large and microcomputer systems. Prereq: CS 406 or 410; DCE 492. Not open to WSBE majors. 4 cr.

592. Database Applications
Students use database software and design and implement a management information system using a database management system. Prereq: CS 406 or 410; DCE 492. Not open to WSBE majors. 4 cr.

595. Independent Study in Computer Information Studies
Students adequately prepared by coursework and/or experience pursue an in-depth project under the direction and supervision of the coordinator. Prereq: permission prior to registration. 1–4 cr.

596. Technical Writing
Students learn to produce both technical and nontechnical documents for applications in education, business, industry, and the home. Each student creates small manuals for critique by the instructor and the class. Topics include logical thinking and organization, interviewing skills, technical writing styles and formats, word processing/graphic programs, pasteup, color usage, cover selection/design, interfacing with a print shop, and budget analysis. Prereq: ENGL 401 or 501; CS 401 (or 495). 4 cr.

597. Documentation Practicum
This independent work project stresses techniques and mechanics required to produce a highly useful, professional document. Under the direction of a coordinator, students apply knowledge previously acquired through courses in this program to create a substantial, final product. Prereq: DCE 596 or permission. 2 cr.

Criminal Justice

552. Corrections Treatment and Custody
Scientific diagnosis and treatment of offenders. Institutional administration methods' climate, personnel, structure, and procedure. 4 cr. (Not offered every semester.)

554. Juvenile Delinquency
Overview of criminological research and theory regarding patterns and sources of juvenile delinquency. Examines the history and structure of the American juvenile justice system. 4 cr. (Not offered every semester.)

Merchandising

411. Promotion and Advertising
Mass communication in marketing; use of advertising media; integration of promotional plans and sales techniques; evaluation of promotional efforts. Not open to WSBE majors. 4 cr. (Not offered every year.)

531. Salesmanship
Principles and techniques of personal selling; customer's needs and satisfaction. Not open to WSBE majors. 4 cr.

Earth, Oceans, and Space, Institute for the Study of (EOS)

(For program description, see page 82.)

Director: Berrien Moore III
Professors: John D. Aber, Roger L. Arnoldy, Wendell S. Brown, Edward L. Chupp, Henri E. Gaudette, Robert C. Harriss, Joseph Hollweg, Martin A. Lee, Paul A. Mayewski, Berrien Moore III, Roy B. Torbert
Research Professors: Terry Forbes, William R. Webber
Associate Professors: Theodore C. Loder III, Eberhard Möbius, Barrett N. Rock, James M. Ryan
Research Associate Professors: Ann C. Bucklin, Janet W. Campbell, Patrick M. Crill, David J. Forrest, Mark E. Hines, Changsheng Li, Robert W. Talbot, W. T. Vestrand
Research Assistant Professors: Jack E. Dibb, Philip A. Isenberg, Lynn M. Kistler, Craig A. Kletzing, Mark L. McConnell, Terrance G. Onsager, David L. Skole, James E. Vogelmann, Charles J. Vorosmarty, Gregory A. Zielinski

707. Global Ecosystem Policy
Scientific and institutional issues pertinent to global change; long-term effects of major human perturbations (greenhouse warming of the atmosphere, ozone depletion, deforestation, desertification, and biotic and soil impoverishment) and human-environment feedback mechanisms on the viability of ecosystems; effectiveness of existing and alternative national, regional, and international institutions in responding to global change. Prereq: permission. 3 cr.

712. Physics of the Ionosphere
Introduces basic plasma physics using a case study of the Earth's ionosphere and its connection both to the upper atmosphere and to the Earth's magnetosphere. Topics include single particle motion, fluid and kinetic descriptions of ionospheric plasma, wave propagation, and instabilities. Prereq: electric. and magnet. I or equivalent; calculus II. (Also offered as PHYS 712.) 4 cr.

713. Biogeochemical Dynamics
Examines the influence of biological processes on geochemical transformations and elemental cycles from the molecular to the global scale involving both microorganisms and higher plants and animals; factors that regulate cycles; interactions among biosphere, hydrosphere, lithosphere, and atmosphere; transformations of C, N, S, and trace elements. Prereq: one semester each biology and chemistry. 3 cr.

#715. Atmospheric and Precipitation Chemistry
Interdisciplinary course concerned with understanding the physical and chemical processes that affect the composition of the atmosphere and precipitation and that are of fundamental importance to the atmosphere-biosphere-cryosphere-hydrosphere-lithosphere-anthrosphere systematics of planet Earth. Topics include tropospheric chemistry; chemistry of rain, snow, and fog; the ozone problem; and the global climatic relationships. Prereq: one year chemistry or permission. 3 cr.

#717. Global Biogeochemical Modeling
Modeling the global system and the interactive processes of its components (atmosphere, hydrosphere, cryosphere, pedosphere, lithosphere, biosphere, and anthrosphere); sensitivity analyses of models to identify incompatibilities and interactive instabilities and comparison with observation from field studies and remote sensing; applying techniques involving large database management to estimate global productivity, simulate biogeochemical cycling, and detect vegetative stress in terrestrial ecosystems. Prereq: MATH 745-746; permission. 3 cr.

754. Ocean Waves and Tides
Introduction to waves: small amplitude, linear wave theory, standing and propagating waves, transformation in shallow water, energy and forces on structures, generation by wind and specification of a random sea, long waves with rotation, and internal waves. Introduction to tides: description of tides in ocean tidal generation forces, equilibrium tide, and tidal analysis. Lab/project: field and lab measurements with computer analysis. Prereq: PHYS 407-408; MATH 527;/or permission. (Also offered as OE 754.) Lab. 4 cr.

764. Introductory Paleoclimate Analysis
An overview of paleoclimate indicators for the last one million years in the context of global teleconnections (atmosphere-lithosphere-hydrosphere-cryosphere) and mathematical tools developed to interpret and link the different records of climate change. Prereq: one year calculus, one year chemistry, basic statistics;/or permission. (Also offered as ESCI 764.) 4 cr.

Earth Sciences (ESCI)

(For program description, see page 59.)

Chairperson: S. Lawrence Dingman
Professors: Franz E. Anderson, Francis S. Birch, Wallace A. Bothner, Wendell S. Brown, S. Lawrence Dingman, Henri E. Gaudette, Robert C. Harriss, Paul A. Mayewski, Herbert Tischler
Adjunct Professors: Eugene L. Boudette, Anthony Jack Gow, Lincoln R. Page
Associate Professors: Jo Laird, Theodore C. Loder III, Karen L. Von Damm
Research Associate Professors: Patrick M. Crill, Mark E. Hines, Robert W. Talbot
Adjunct Associate Professor: Neal R. Pettigrew
Assistant Professor: John Matthew Davis
Research Assistant Professors: Jack E. Dibb, Charles J. Vorosmarty, Larry G. Ward, Gregory A. Zielinski
Adjunct Assistant Professor: Mark A. Person

401. Principles of Geology I
The earth; earth materials (rocks and minerals), landforms, and the processes that form them (volcanism, earthquakes, glaciation, etc.). Field trips. Lab. Special fee. 4 cr.

402. Principles of Geology II
Geological history of the earth: interpretation of past geologic events emphasizing the geological development of North America and the evolution of life. Special fee. Lab. 4 cr.

405. Global Environmental Change
Human activity rivals nature as an agent of change in the global environment. Explores evidence of environmental degradation in Earth's crust, hydrosphere, and atmosphere; considers prospects for future sustainable human health, diversity, and economic development. Problem solving through critical analysis of environmental variables. Lab. 4 cr.

409. Environmental Geology
Environmental impact of geologic processes; natural hazards—landslides, earthquakes, volcanoes, flooding, erosion, and sedimentation; land exploitation and site investigations; environmental considerations of water-supply problems; the recovery of energy and mineral resources. Special fee. Lab. Students may not receive credit for both ESCI 401 and ESCI 409. 4 cr.

450. Introduction to the Earth Sciences
Modular course introducing contemporary topics in earth sciences. Successful completion of four modules fulfills one gen ed Group 3 (physical science) requirement. Each module is approximately 3.5 weeks. Four of the following topics are offered each semester (check *Time and Room Schedule* for current semester offerings): Planetary Geology; Plate Tectonics; Rocks and Minerals; Earthquakes; Water Resources of New England; Springs and Underground Rivers; Evolution of Mountains; Volcanoes; The Global Ocean; The Gulf Stream; Geologic Time; Climate Change; Beaches and Coasts; Prehistoric Life; Energy and the Environment; Geology of Puerto Rico. Additional topics may be available. Special fee. Lab. 1 cr.

501. Introduction to Oceanography
Physical, chemical, geological, and biological processes in the sea. Special fee. Lab. 4 cr.

512. Principles of Mineralogy
Natural history of the solid state; introductory crystallography, diffraction, and structure of minerals. Silicate minerals; their chemical and physical properties, origins, occurrences, and uses. Nonsilicates. Prereq: CHEM 401, 403, or 405. Field trips. Special fee. Lab. 4 cr.

530. Field Methods
Standard geological field-mapping techniques, including pace and compass and plane table and alidade; bedrock and surficial mapping on topographic and aerial photographic bases in local areas; one 4- to 5-day exercise in a selected area of the northern Appalachian Mountains. Prereq: ESCI 401 or 409; 402. Special fee. 4 cr.

561. Surficial Processes
Processes leading to the development of landforms, chemical and mechanical weathering of earth-surface materials and erosion and transport in colluvial, fluvial, glacial, and coastal systems. Field trips. Special fee. Lab. 4 cr.

595, 596. Introductory Investigations in Earth Sciences
Special topics by means of lectures, conferences, assigned readings, and/or field or laboratory work in the areas of geology, hydrology, or oceanography. 1–4 cr.

614. Optical Mineralogy and Petrography
Description and classification of igneous, sedimentary, and metamorphic rocks in hand specimen and thin section; optical mineralogy. Prereq: ESCI 512. Special fee. Lab. 4 cr.

631. Structural Geology
Structural units of the earth's crust and mechanics of their formation. Prereq: ESCI 530. Special fee. Lab and fieldwork. 4 cr.

652. Paleontology and Biostratigraphy
Systematic study of major invertebrate fossil groups emphasizing their stratigraphic and paleoecologic uses. Prereq: ESCI 402 or permission. Special fee. Lab. 4 cr.

653. Estuaries and Coasts
Examines physical and biological aspects of estuaries and coasts with special regard to sediment transport. Includes field trips and cruises to the coastal environments of New Hampshire and Maine, with follow-up laboratory analyses. A student project is required involving field sampling and oceanographic equipment design, fabrication, and testing. Prereq: ESCI 501;/or permission. Special fee. Lab. 4 cr.

703. Fluvial Hydrology
Mechanics of natural open-channel flow: forces, the continuity and energy principles, velocity distributions, flow resistance, fluvial erosion and sediment transport, channel form, computation of flow profiles, weirs, hydraulic jumps, and stream-flow routing. Lab and field exercises. Prereq: one year each of calculus and physics. 4 cr.

705. Principles of Hydrology
Basic physical principles important in the land phase of the hydrologic cycle, including precipitation, snowmelt, infiltration and soil physics, evapotransportation, and surface and subsurface flow to streams. Problems of measurement and aspects of statistical treatment of hydrologic data. Field trips. Prereq: one year each of calculus and physics. Special fee. Lab. 4 cr.

708. Hydrology and Water Resources
Interrelations of hydrologic data and analysis with the environmental, economic, and legal aspects of water resource management. Examines local, national, and global water-resource problems Prereq: ESCI 705; basic statistics;/or permission. 3 cr. (Offered alternate years.)

710. Groundwater Hydrology
Principles for fluid flow in porous media with emphasis on occurrence, location, and development of groundwater but with consideration of groundwater as a transporting medium. Major topics include well hydraulics, regional groundwater flow, exploration techniques, and chemical quality Laboratory exercises involve use of fluid, electrical, and digital computer models to illustrate key concepts. Prereq: ESCI 705 or permission. Lab. 4 cr.

#725. Igneous Petrology
The evolution of igneous rocks as determined from field, petrographic, chemical, experimental, and theoretical studies. Application of thermodynamics to igneous petrogenesis. Physical properties of magmas. Prereq: mineralogy; petrography; adequate background in calculus, chemistry, and physics. Field trips. Special fee. Lab. 4 cr. (Offered alternate years with ESCI 726.)

726. Metamorphic Petrology
The metamorphism of pelitic, mafic, and calc silicate rocks as determined from field, petrographic, mineral chemistry, experimental, and theoretical studies. Closed- and open-system reactions, multisystems, reaction space. Calculation of pressure-temperature time paths. Prereq: mineralogy; petrography; adequate background in calculus, chemistry, and physics. Field trips. Special fee. Lab. 4 cr. (Offered alternate years with ESCI 725.)

732. Regional Geology and Advanced Structure
Readings, discussion, and field/lab exercises in the tectonic analysis of mountain systems. Emphasis on the northern Appalachian Orogen. Application of modern structural analysis. Field excursion. Prereq: ESCI 631 or permission. Special fee. 4 cr.

734. Applied Geophysics
Gravity, magnetic, seismic, electrical, and thermal methods of investigating subsurface geology. Fieldwork and use of computers in data analysis. Prereq: ESCI 401; one year of calculus; one year of college physics;/or permission. Special fee. Lab. 4 cr.

741. Geochemistry
Thermodynamics applied to geological processes; geochemical differentiation of the earth; the principles and processes that control the distribution and migration of elements in geological environments; stable and radiogenic isotopes in geologic processes. Prereq: ESCI 512 or permission. 4 cr.

747. Aqueous Geochemistry
Processes that determine the geochemical characteristics of water bodies. Emphasis on the geochemical continuum of terrestrial water and its geochemical evolution. Topics include the influence of cyclic salts, the nature of weathering reactions, the CO_2-$CaCO_3$ system, the formation and dissolution of salts and authigenic mineral formation. Prereq: one year of chemistry or geochemistry;/or permission. Lab. 4 cr.

#750. Biological Oceanography
Biological processes of the oceans, including primary and secondary production, trophodynamics, plankton diversity, zooplankton feeding ecology, microbial ecology, and global ocean dynamics. Emphasis on experimental approaches. Term project involves either development of an ecosystem model or performance of a field experiment. Field trips on R/V *Jere A. Chase* and to the Jackson Estuarine Laboratory. Prereq: one year of biology or permission of the instructor. (Also offered as ZOOL 750.) 4 cr.

752. Chemical Oceanography
Water structure, chemical composition and equilibrium models, gas exchange, biological effects on chemistry, trace metals, and analytical methods. Lab includes short cruise aboard R/V *Jere A. Chase*. Prereq: permission. Lab (optional). 3 or 4 cr.

754. Modern Sediments
Examines recent sediments from their source area to the depositional environment. Emphasis on shallow-water clastic sediments and their characteristic properties. Weekly lab, conducted off campus at the Jackson Estuarine Laboratory, is concerned with aspects of textural and compositional analysis. New analytical techniques compared with classical sediment analysis. Lab. 4 cr.

#756. Estuarine Sedimentation
Examines all aspects of estuarine sedimentation, from erosion and transportation to deposition. Emphasis on fine-grained estuarine sediments and factors affecting particulate matter transport. Animal/sediment and plant/sediment interactions considered in detail. Includes an in-depth field research project in student's area of interest conducted by graduate students with undergraduate participation at the Jackson Estuarine Laboratory. Subject matter is relevant to students in related disciplines in which animal/plant/sediment relationships are important. Lab. 4 cr.

758. Introductory Physical Oceanography
Descriptive treatment of atmosphere-ocean interaction; general wind-driven and thermohaline ocean circulation; waves and tides; continental shelf and nearshore processes; instrumentation and methods used in ocean research. Simplified conceptual models demonstrate the important principles. Prereq: college physics; ESCI 501;/or permission. 3 cr.

759. Geological Oceanography
Major geological features and processes of the ocean floor; geological and geophysical methods; plate tectonics. Prereq: two semesters each of calculus, physics, and geology. Lab. 4 cr.

762. Glacial Geology
Glacial environment: glacier dynamics and glacial erosion and deposition. Review of world glacial stratigraphy in light of causes of glaciation and climatic change. Field trips. Prereq: ESCI 561 or permission. Lab. 4 cr.

#763. Glacier Research
Glaciers as proxy indicators of climatic change with specific emphasis on the interpretation of physical and chemical time series collected from glaciers. Field and laboratory work used as a tool in the course. Prereq: geomorphology; glacial geology; one year of college calculus; one semester each of college physics and chemistry;/or permission. 4 cr.

764. Introductory Paleoclimate Analysis
An overview of paleoclimate indicators for the last one million years in the context of global teleconnections (atmosphere-lithosphere-hydrosphere-cryosphere) and mathematical tools developed to interpret and link the different records of climate change. Prereq: one year cal-

culus, one year chemistry, basic statistics;/or permission. (Also offered as EOS 764.) 4 cr.

795, 796. Topics in Earth Sciences
Geologic, hydrologic, and oceanographic problems and independent studies by means of conferences, assigned readings, and field or laboratory work fitted by ESCI faculty to individual student needs; or, new or specialized courses. Topics include geochemistry; geomorphology; geophysics; glaciology; groundwater, structural, and regional geology; crystallography; mineralogy; petrology; thermodynamics; ore deposits; earth resource policy; paleontology; sedimentation; stratigraphy; water resources management; chemical, physical, and geographical oceanography; earth systems. Also, senior synthesis and earth science teaching methods. 1–4 cr.

Economics (ECON)

(For program description, see page 80.)

Chairperson: Richard W. England
Professors: Robert C. Puth, Evangelos O. Simos
Associate Professors: Karen Smith Conway, Richard W. England, Marc W. Herold, Richard L. Mills, Neil B. Niman, Allen R. Thompson, James R. Wible
Adjunct Associate Professors: Ralph B. Bristol, Jr., Evangelos Charos
Assistant Professors: William D. Bradford III, Bruce T. Elmslie, Michael D. Goldberg, Torsten Schmidt, Stanley A. Sedo

401. Principles of Economics (Macro)
Basic functions of the United States economy viewed as a whole: policies designed to affect its performance. Economic scarcity, supply and demand, the causes of unemployment and inflation, the nature of money and monetary policy, the impact of government taxation and spending, the federal debt, and international money matters. 4 cr.

402. Principles of Economics (Micro)
Functions of the component units of the economy and their interrelations. Units of analysis are the individual consumer, the firm, and the industry. Theory of consumer demand and elasticity, supply and costs of production, theory of the firm under conditions of perfect and imperfect competition, demand for and allocation of economic resources, general equilibrium, and basic principles and institutions of international trade. (Not open to students who have had RECO 411.) 4 cr.

515. Economic History of the United States
United States economy from colonial times to the present. Models of economic development applied to the United States. How social, political, technological, and cultural factors shape economy; development and influence of economic institutions. Prereq: ECON 401 or 402;/or permission. 4 cr.

518. European Economic History
Western European economies from medieval times to the present. Explanations for differential growth rates and patterns; comparisons among political, social, and economic events. Prereq: ECON 401 or 402;/or permission. 4 cr.

602. Introduction to Political Economy
Theoretical and historical analyses of capitalism and socialism. Specific topics such as racism, monopoly, militarism, technological change, pollution, and business cycles. Prereq: ECON 401; ECON 402;/or permission. 4 cr.

605. Intermediate Microeconomic Analysis
Analysis of supply and demand. Determination of prices, production, and the distribution of income in noncompetitive situations and in the purely competitive model. General equilibrium. Prereq: ECON 402. 4 cr.

607. Ecological Economics
Analysis of efficiency, equity, and growth issues in the economy and their links to environmental quality and natural resources availability. Case studies of global warming, world hunger, etc. Prereq: ECON 401 and 402. 4 cr.

611. Intermediate Macroeconomic Analysis
Macroeconomic measurement, theory, and public policy determination. Prereq: ECON 401 and 402. 4 cr.

615. History of Economic Thought
Examination and critical appraisal of the work of major economists, including the work of contemporary economists, and major schools of economists, particularly with reference to the applicability of their theories to current economic problems. Prereq: ECON 401 and 402. 4 cr.

626. Applied Regression Analysis
Introduction to regression techniques as used in economics and management; estimation and statistical inference in the context of the general linear model; discussion of problems encountered and their solutions; extensions of the general linear model. Prereq: DS 420. (Also offered as DS 626.) 4 cr.

630. Comparative Study of Economic Systems
Analyzes crisis of ideologies, markets, and nonmarket systems. Swedish capitalism, reform processes of state socialist systems (Russia, Poland, Hungary), and the centrally planned Cuban economy. Stresses theory, policy, and institutions. Prereq: ECON 401 or permission. 4 cr.

635. Money and Banking
Study of interest rates, financial markets, financial institutions, monetary institutions, the supply of money, the demand for money, monetary theory, and monetary policy. Prereq: ECON 401 and 402. 4 cr.

641. Public Finance
Alternative prescriptions and explanations concerning the role of government in contemporary market economies. General principles of public expenditure analysis. Selected case studies of public spending programs, e.g., welfare, defense, education. Analysis of various federal, state, and local taxes. Prereq: ECON 401; ECON 605;/or permission. 4 cr.

645. International Economics
Covers both international trade theory and open-economy macroeconomics. Major issues include whether free trade is always preferred to restricted trade, the controversy over industrial policy, and how best to structure the international financial system. Students gain an understanding of topics including currency exchange rate movements, macroeconomic adjustment mechanisms and trade policy, among others. Prereq: ECON 401 and 402. 4 cr.

651. Government Regulation of Business
Mergers, competition, monopoly, and the regulated industries. 4 cr.

656. Labor Economics
Functioning of labor markets from theoretical and policy perspectives. Labor demand and supply, wages and employment. Welfare programs, human capital, discrimination in the labor market, unions, wage differentials. Prereq: ECON 401; ECON 402; ECON 605 recommended. 4 cr.

668. Economic Development
Theories of development/underdevelopment. Trade, growth, and self-reliance. The role of agriculture (land tenure, food crisis, Green Revolution). World Bank policy. Industrialization strategies. Role of the state. Prereq: ECON 401; ECON 402;/or permission.

669. Women and Economic Development
Examines the position, roles, and contribution of women in economic development as interpreted through different discourses (feminisms, modernity, postmodernity) and in theoretical conceptualizations (neoclassical integrationists, liberal feminism, class and gender, feminist ecology). Applied analyses on Africa, South Asia, and Latin America. Prereq: permission. 4 cr.

670. Economics of Energy
The availability and use of inanimate energy resources and their relation to economic activity. Investigates energy demand, energy supply, the relation of energy to economic growth, and energy policy. Prereq: ECON 605 or permission. 4 cr.

#685-#686. Study Abroad
Open to students studying abroad in the discipline as approved by the economics program director. 1–16 cr. Cr/F.

695. Independent Study
Individual research projects that are student designed. Initial sponsorship of an economics faculty member must be obtained, and approval of WSBE adviser and dean. For juniors and seniors in high standing. Up to 4 credits may be used as a major elective. Variable (in multiples of 2). 2–12 cr.

696. Supervised Student Teaching Experience
Participants are expected to perform such functions as leading discussion groups, assisting faculty in undergraduate courses that they have successfully completed, or working as peer advisers in the advising center. Enrollment limited to juniors and seniors who have above-average

G.P.A.s. Reflective final paper is required. Prereq: permission of instructor, department chair, and director of advising. 1–4 cr. May be repeated to a maximum of 4 cr. Cr/F.

698. Topics in Economics
Special topics. May be repeated. Prereq: permission. 4 cr.

707. Economic Growth and Environmental Quality
Analysis of the interrelationships among economic growth, technological change, population increase, natural resource use, and environmental quality. Application of alternative theoretical approaches drawn from the social and natural sciences. Focus on specific environmental problems, e.g., affluence and waste disposal problems, and environmental impact of technology transfer to less-developed nations. Prereq: ECON 605; ECON 611;/or permission.

711. Economic Fluctuations
Recurrent movements of prosperity and depression; emphasis on causes and public policy implications. Prereq: ECON 611 or permission. 4 cr.

#715. Marxian Economic Analysis
Analysis of capitalism by Marx and contemporary Marxists. Discussion of social class, values and prices, technical change, capital accumulation, and socioeconomic crises. Prereq: ECON 605; ECON 611;/or permission. 4 cr.

#720. U.S. Economic History
From colonial times to the present. Applied economic theory; economic models and interpretation of data. Influence of technology, industrialization, foreign trade, monetary factors, and government; noneconomic factors. Prereq: ECON 605; ECON 611;/or permission. 4 cr.

725. Mathematical Economics
Principal mathematical techniques and their application in economics. Topics covered: matrix algebra, derivatives, unconstrained and constrained optimization, linear and nonlinear programming, game theory, elements of integral calculus 4 cr

#727. Advanced Econometrics
Relatively advanced econometric techniques such as simultaneous equation models, distributed lag models, nonlinear estimation, and limited dependent variables. Prereq: ECON/DS 626 and permission. 4 cr

#735. Economics of Financial Markets
Economic analysis of financial market systems. Topics include financial market functions, theories of saving and investment, financial intermediation, flow-of-funds analysis, loanable funds theory, interest rate forecasting, portfolio theory, capital-asset pricing models, structure of interest rates (including term-structure theory), and macroeconomic models of the financial sector Prereq: ECON 635. 4 cr.

736. Seminar in Monetary Theory and Policy
Contemporary developments in monetary theory and the evaluation of policy measures. Prereq: ECON 635. 4 cr

741. Introduction to Public Policy
Explores the basic issues of public sector economics and emphasizes the use of economic theory in predicting the effects of public policy on individual behavior and the overall economy. Specific topics include market failures, collective decision making, cost/benefit analysis, and an evaluation of tax and transfer programs. 4 cr.

745. International Trade
Contemporary issues in international economic theory and policy. Analysis of trade theory, dynamics of world trade and exchange, and international commercial policy. Prereq: ECON 605; ECON 645. 4 cr.

746. International Finance
International monetary mechanism; balance of payments, international investment; exchange rates, adjustment systems, international liquidity, foreign aid, multinational corporations. Prereq: ECON 611; ECON 645. 4 cr.

#747. Multinational Enterprises
Internationalization of economies. Growth and implications of multinational corporations at the level of systems. Theories of imperialism, international unity/rivalry; theories of direct investment, exercise of influence and conflict, technology transfer, bargaining with host country; effects on U.S. economy. Prereq: permission. 4 cr.

#755. Collective Bargaining
Historical development of the U.S. labor movement and the industrial relations system. Contemporary collective bargaining issues; the role of public policy in industrial relations. 4 cr.

#756. Labor Economics
Recent developments in labor market analysis and public policies related to contemporary labor issues. Labor supply, the structure and stratification of labor markets, economic discrimination, unemployment and poverty, inflation, and wage-price controls. Prereq: ECON 656. 4 cr.

768. Seminar in Economic Development
Advanced reading seminar. Topics include methodologies underlying economic development theory; industrialization and post-import substitution; state capitalist development; stabilization policies; appropriate technologies; the capital goods sector; agricultural modernization schemes; and attempts at transition to socialism. Prereq: permission. 4 cr.

795. Internship
On-the-job skill development through fieldwork in an organization (business, industry, health, public service, etc.). Normally, supervision is provided by a qualified individual in the organization, with frequent consultation by a faculty sponsor. Written report required. Internships may be part or full time, with course credits assigned accordingly. May not be used as a major elective. 1–16 cr. Cr/F.

798. Economic Problems
Special topics; may be repeated. Prereq: permission of adviser and instructor. 2 or 4 cr.

799. Honors Thesis
Supervised research leading to the completion of an honors thesis; required for graduation from the honors program in economics. 4–8 cr.

Education (EDUC)

(For program description, see page 26.)

Chairperson: Susan D. Franzosa
Professors: Michael D. Andrew, Angelo V. Boy, Jane A. Hansen, David J. Hebert, Barbara E. Houston, Dale F. Nitzschke
Associate Professors: Charles H. Ashley, John J. Carney, Grant L. Cioffi, Ellen P. Corcoran, Ann L. Diller, Janet Elizabeth Falvey, Susan D. Franzosa, Virgina E. Garland, Judith A. Kull, Bruce L. Mallory, Rebecca S. New, Jane A. Nisbet, Sharon N. Oja, M. Daniel Smith, Joan D. Stipetic, William L. Wansart, Dwight Webb
Research Associate Professor: Richard H. Goodman
Assistant Professors: Richard M. Barton, Todd A. Demitchell, Georgia M. Kerns, Ann L. Loranger, Joseph J. Onosko, Pearl M. Rosenberg, Paula M. Salvio, Thomas H. Schram, Herbert Wagner III
Research Assistant Professor: Stephen Lichtenstein
Instructors: Stacey A. Gauthier, Daniel A. Rothermel

#410. Women and Education
Examination and analysis of women's educational experience. Study of contemporary and historical processes and structure for educating girls and women. Review and discussion of current research in the education of women, issues of discrimination, and equity and alternative strategies for restructuring society's curriculum for women. 4 cr.

500. Exploring Teaching
For students considering a teaching career. In-school experiences to develop introductory skills in observation and teaching. On-site seminars for analysis and evaluation. Assessment and advising related to teaching as a career. Prerequisite for further work toward teacher certification. Minimum of 7 hours a week, plus travel time, required. Prereq: permission. 4 cr. Cr/F.

#653. Humanities and Education: Society and the Formation of Character
Interdisciplinary modular course examines the manner in which society forms character through custom, laws, and formal institutions. Works by Plato, Rousseau, and Dewey explore if and how we can become educated Students take three successive 5-week modules during the semester. 4 cr. (Not offered every year.)

694. Courses in Supervised Teaching
Supervised Teaching of Music. 8 cr. Cr/F. Supervised Teaching of Adult and Occupational Education. 8 cr. Cr/F. Supervised Teaching of Mathematics. 8 cr. Cr/F.

700. Educational Structure and Change
A) Educational Structure and Change; B) Education in America: Backgrounds, Structure, and Function; C) Governance of American Schools; D) School and Cultural Change; E) Teacher and Cultural Change; F) Social Perspectives of Conflict in the Schools; G) Nature and Processes of Change in Education; H) What Is an Elementary School?; I) Schooling for the Early Adolescent; J) Children with Special Needs: Historical and Institutional Aspects; K) Curriculum Structure and Change; L) Stress in Educational Organizations. Organization, structure, and function of American schools; historical, political, and social perspectives; nature and processes of change in education. Two- and four-cr. courses offered each semester (listed in department prior to preregistration; refer to *Time and Room Schedule*). Minimum of 4 cr. required for teacher certification. Prereq. for teacher certification students: EDUC 500 and permission, which is accomplished by signing the appropriate course roster in the teacher education office. Prereq. for students not seeking teacher certification: permission, as described above. 2 or 4 cr.

701. Human Development and Learning: Educational Psychology
A) Human Development and Learning: Educational Psychology; B) Human Development: Educational Psychology; C) Human Learning: Educational Psychology; D) Developmental Bases of Learning and Emotional Problems; E) Learning Theory, Modification of Behavior, and Classroom Management; F) Cognitive and Moral Development; G) Evaluating Classroom Learning; H) Deliberate Psychological Education; I) Sex Role Learning and School Achievement; J) The Development of Thinking. Child development through adolescence, learning theory, cognitive psychology, research in teaching and teacher effectiveness, and evaluation, all applied to problems of classroom and individual teaching and therapy. Full 4-cr. course and 2-cr. minicourses offered each semester (listed in department prior to preregistration; refer to *Time and Room Schedule*). Minicourses emphasize either development or learning. Candidates for teacher certification are required to have at least 2 cr. of development and 2 cr. of learning, or the full 4-cr. course (701A). Prereq. for teacher certification students: EDUC 500 and permission, which is accomplished by signing the appropriate course roster in the teacher education office. Prereq. for students not seeking teacher certification: permission, as described above. 2 or 4 cr.

703. Alternative Teaching Models
A) Alternative Teaching Models; B) Curriculum Planning for Teachers; C) Alternative Strategies for Maintaining Classroom Control; D) Social Studies Methods for Middle and High School Teachers; F) Teaching Elementary School Science; G) Language Arts for Elementary Teachers; H) Experiential Curriculum; I) Children with Special Needs: Teaching Strategies for the Classroom Teacher; K) Writing across the Curriculum; L) Learning and LOGO; M) Teaching Elementary School Social Studies. Basic teaching models, techniques of implementation, and relationships to curricula. Two- or four-cr. courses offered each semester (listed in department prior to preregistration; refer to *Time and Room Schedule*). Minimum of 4 cr. required for teacher certification. For secondary teacher candidates, the appropriate methods course, taught in the department of the major, or EDUC 791 for physical science candidates, usually satisfies this requirement. EDUC 703F and 703M are required for candidates for elementary teacher certification. Prereq. for teacher certification students: EDUC 500 and permission, which is accomplished by signing the appropriate course roster in the teacher education office. Prereq. for students not seeking teacher certification: permission, as described above. 2 or 4 cr.

705. Alternative Perspectives on the Nature of Education
A) Contemporary Educational Perspectives; B) Controversial and Ethical Issues in Education; D) Concepts of Teaching: Differing Views; E) Curriculum Theory and Development; F) Readings on Educational Perspectives; G) Philosophy of Education; I) Education as a Form of Social Control; K) Schooling and the Rights of Children; L) Education, Inequality, and the Meritocracy; M) Readings in Philosophies of Outdoor Education; N) Alternative Perspectives on the Nature of Education; O) Classrooms: The Social Context; P) Teaching: The Social Context; Q) School and Society. Students formulate, develop, and evaluate their own educational principles, standards, and priorities. Alternative philosophies of education; contemporary educational issues. Variable credit modules offered each semester (listed in department prior to preregistration; refer to *Time and Room Schedule*). Minimum of 4 cr. required for teacher certification. Prereq. for teacher certification students: EDUC 500 and permission, which is accomplished by signing the appropriate course roster in the teacher education office. Prereq. for students not seeking teacher certification: permission, as described above. 2 or 4 cr.

706. Introduction to Reading Instruction in the Elementary Schools
Reading process; current procedures and materials; diagnostic techniques; practicum experience. Course satisfies reading requirement for prospective elementary teachers in the five-year teacher education program and may be included in the 12 required graduate credits in education at the graduate level. May also be taken for undergraduate credit before entrance into fifth year; in this case the course satisfies reading requirement but is not applicable toward the 12 required graduate credits. Prereq: EDUC 500; permission. 4 cr.

707. Teaching Reading through the Content Areas
Approaches and methods for teaching reading through content materials; coursework includes practical applications through development of instructional strategies and materials. Required for candidates seeking certification in art, biology, chemistry, earth science, general science, physics, or social studies. Prereq: permission. 2 cr.

720. Introduction to Computer Applications for Education
Examination of major issues related to classroom computer applications: historical development, computer functioning, methods of introduction, problem solving, educational software development and evaluation, psychological and sociological impact of the computer on children and learning. Introduction to classroom applications of the programming language LOGO and the authoring language PILOT. A practical approach is stressed. Lab. 4 cr.

733. Introduction to the Teaching of Writing
Development of writers, child to adult; ways to respond to writing; organization of the classroom for the teaching of writing. Persons taking the course need to have access to students to carry out course requirements. Prereq: permission. 4 cr.

734. Children's Literature
Interpretive and critical study of literature for children in the elementary, middle, and junior high schools. Methods of using literature with children. 4 cr.

#741. Exploring Mathematics with Young Children
A laboratory course offering those who teach young children mathematics, and who are interested in children's discovery learning and creative thinking, an opporunity to experience exploratory activities with concrete materials. It offers, on the adult level, mathematical investigations through which one may develop the ability to provide children with a mathematically rich environment, to become adept at asking problem-posing questions, and to establish a rationale for so doing. 4 cr.

750. Introduction to Exceptionality
Social, psychological, and physical characteristics of exceptional individuals, including intellectual, sensory, motor, health, and communication impairments. Implications for educational and human service delivery. 4 cr.

751. Educating Exceptional Learners
Foundations of special education and introduction to the techniques of special teaching. Primary application to learners with mild and moderate disabilities. 4 cr.

752. Diagnosis and Remediation of Learning Disabilities
Terminology, etiology, common characteristics, and symptoms; theory and practice in gross-motor, visual, and auditory remediation; testing procedures used in diagnosis and remediation programs. 4 cr.

#753. Children with Behavior Disorders
Nature and scope of emotional disturbances and social maladjustment in children, including causes, characteristics, treatment implications, and educational problems. 4 cr.

754. Survey of Developmental Disabilities
The causal factors, physical and psychological characteristics, and educational and therapeutic implications of mental retardation, cerebral palsy, epilepsy, autism, and related disabling conditions. Observations of programs and services for the developmentally disabled are required. 4 cr.

760. Introduction to Young Children with Special Needs
Needs of children (birth to eight years) with developmental delays or who are at risk for disabilities. Strengths and special needs of such children; causes, identification, and treatment; current legislation; parent and family concerns; program models. 4 cr.

776. Reading for Children with Special Needs
Techniques and procedures for teaching reading to children with special learning needs: the mentally retarded; learning disabled; gifted; culturally diverse. Emphasis on the implications of providing reading instruction in the least restrictive alternative. 4 cr.

781. Probability and Statistics
Introductory-level coverage of applied probability and statistical methods. Problems selected from many disciplines, with a focus on the behavioral and social sciences, to illustrate the logic and typical application of the techniques. Emphasis on understanding concepts through analyses of prepared data. 4 cr.

785. Educational Tests and Measurements
Theory and practice of educational evaluation; uses of test results in classroom teaching and student counseling; introductory statistical techniques. 4 cr.

791. Methods of Teaching Secondary Science
Application of theory and research findings in science education to classroom teaching with emphasis on inquiry learning, developmental levels of children, societal issues, integration of technology, critical evaluation of texts and materials for science teaching, and planning for instruction. Lab. 4 cr.

795, 796. Independent Study
Juniors and seniors only, with approval by appropriate faculty member. Neither course may be repeated. 2 or 4 cr.

797. Seminar in Contemporary Educational Problems
Issues and problems of special contemporary significance, usually on a subject of recent special study by faculty member(s). Prereq: permission. May be repeated for different topics. 1–4 cr.

Electrical and Computer Engineering (EE)

(For program description, see page 60.)

Chairperson: John L. Pokoski
Professors: Ronald R. Clark, Albert D. Frost, Filson H. Glanz, L. Gordon Kraft, John R. LaCourse, W. Thomas Miller III, Joseph B. Murdoch, John L. Pokoski, Kondagunta Sivaprasad
Adjunct Professors: Sidney W. Darlington, Robert E. Levin
Associate Professors: Michael J. Carter, Kent Chamberlin, Allen D. Drake, Donald W. Melvin, Richard A. Messner, Paul J. Nahin, Andrzej Rucinski
Adjunct Associate Professor: Stuart M. Selikowitz
Adjunct Assistant Professor: Benjamin H. Hoffman
Instructor: Francis C. Hludik, Jr.

#496. Elementary Topics in Electrical Engineering
Introductory topics in electrical engineering. Prereq: permission. 1–4 cr.

535. Circuits and Signals
Circuit elements; signal waveforms; circuit laws and theorems; transfer functions; Laplace transforms; free, forced, and steady-state responses; power. Non-EE majors only. Prereq: MATH 426; PHYS 408. Lab. 4 cr.

536. Electronics and Electromagnetics
Semiconductor diode and transistor theory and application, amplifiers and frequency response, magnetic fields and circuits, three-phase, transformers, DC machines. Non-EE majors only. Prereq: EE 535. Lab. 4 cr.

541. Electrical Circuits
Linear passive circuits beginning with resistive circuits, independent and dependent sources, basic op amps, power and energy relations, mesh and node analysis. Energy storage elements, capacitor and inductors, transient and steady-state circuit analysis for first- and second-order circuits. Steady-state AC circuits using phasors. For EE majors only. Prereq: MATH 426; pre- or coreq: PHYS 408. Lab and discussion. 4 cr.

543. Introduction to Digital Systems
Fundamental analysis and design principles. Number systems, codes, Boolean algebra, and combinational and sequential digital circuits. Lab: student-built systems using modern integrated circuit technology and an introductory design session on a CAD workstation. Lab. 4 cr.

544. Engineering Analysis
Review of infinite series and multiple integrals. Differential calculus of functions of several variables. Vector differential and integral calculus with applications to electrostatics and magnetostatics. Prereq: MATH 527. 3 cr.

548. Circuits and Electronics
Continuation of Electrical Circuits, including AC analysis, power, complex frequency, Laplace transforms. Introduces circuits containing diodes and BJTs. Prereq: EE 541. Lab. 4 cr.

#596. Topics in Electrical Engineering
Topics in electrical engineering. Prereq: permission. 1–4 cr.

603. Electromagnetic Fields and Waves
Maxwell's equations in integral and differential form with applications to static and dynamic fields. Uniform plane waves in free space and material media. Boundary conditions; simple transmission line theory, parallel plate and rectangular waveguides; simple radiating systems. Development of report writing and oral presentation skills. Prereq: PHYS 408; EE 544 or equivalent. 3 cr.

603H. Electromagnetic Fields and Waves I/ Honors
Same topics as EE 603. Honors students will attend an additional one-hour meeting each week. Prereq: PHYS 408; EE 544 or equivalent. 4 cr.

612. Computer Organization
Basic computer structure, including arithmetic, memory, control, and input/output units; the trade-offs between hardware, instruction sets, speed, and cost. Laboratory experiments involving machine language programming and I/O interfacing using microcomputers. Prereq: CS 410C; EE 543; permission. Lab. 4 cr.

617. Junior Laboratory I
Application of laboratory instrumentation to the investigation of active and passive circuit characteristics; introduction to computer-aided design, analysis, and testing; development of report writing and oral presentation skills. Coreq: EE 651; EE 645. 2 cr.

618. Junior Laboratory II
Laboratory exercises in the design and analysis of active circuits, techniques of signal processing, and the properties of distributed circuits. Continued development of report writing and oral presentation skills. Prereq: EE 617. Coreq: EE 603; EE 657. 2 cr.

620. Electronics and Instrumentation
For non-engineering and non-physics students; no mathematical or engineering detail. Techniques for using electronic instruments and equipment. DC and AC circuits, electronic amplifiers, grounding and shielding problems, transducers, electronic instruments, schematic reading, transients, noise problems, and digital techniques. Prereq: junior standing. 4 cr.

645. Electrical Networks
Two ports and transfer functions, time and frequency domain concepts, Fourier series and transforms, state equations, convolution, introductory network synthesis, passive and active filter design, and approximation. Prereq: EE 548. 3 cr.

645H. Electrical Networks/Honors
Same topics as EE 645. Honors students will attend an additional one-hour meeting each week. Prereq: EE 548. 4 cr.

647. Random Processes in Electrical Engineering
Emphasis on applied engineering concepts such as component failure, quality control, noise propagation. Topics include random variables, probability distributions, mean and variance, conditional probability, correlation, power spectral density. Prereq: EE 544. 2 cr.

651. Advanced Electronics I
FETS; differential and multistage amplifiers; frequency response; feedback; development of writing skills. Prereq: EE 548. 3 cr

652. Advanced Electronics II
Output stages; power amplifiers; frequency re-

sponse; feedback; analog ICs; filters; tuned amplifiers; signal generators; wave-shaping circuits; MOS and bipolar digital circuits; development of writing and oral presentation skills. Prereq: EE 651. 4 cr.

657. Electromechanical Energy Conversion
Magnetic circuits; theory and analysis of transformers and induction; synchronous, DC, brushless, and stepping motors and generators. Design of systems with these components. Prereq: EE 548. Coreq: EE 603. 2 cr.

681. Teaching Experience
Credit for assisting in the instruction of undergraduate laboratories. Available on a limited basis to students selected by the department chairperson. May be repeated for credit up to a total of 4 credits. 1 cr.

690. Engineering Design Principles I
Lectures, seminars, and discussions related to engineering design and professionalism. Provides background for capstone design experience. Topics include: creativity, design methodology, specification development, total quality management, ethics, safety, reliability, aesthetics, and preparation for oral and written reports. .5 cr. Cr/F.

691. Engineering Design Principles II
Continuation of EE 690. .5 cr. Cr/F.

Some 700-level courses are offered subject to adequate student demand. Most 700-level courses require writing reports and oral presentations.

704. Electromagnetic Fields and Waves II
Loop antennas; aperture and cylindrical antennas; self and mutual impedance; receiving antennas and antenna arrays; bounded plane waves; rectangular and cylindrical waveguides; waveguide discontinuities and impedance matching; solid state microwave sources. Prereq: EE 603. 4 cr.

711. Digital Systems
Digital design principles and procedures, including top-down design techniques, prototyping and documentation methods, and realistic considerations such as grounding, noise reduction, loading, and timing; digital design and development tools; computer-aided design using microprocessor development systems and engineering workstations including hands-on experience with state-of-the-art design automation systems. Prereq: EE 612; permission. Lab. 4 cr.

714. Real-Time Computer Applications
Organization and programming of real-time computer-based systems. Special purpose peripherals, digital filters, program and data organization, priority interrupt processing of tasks, real-time monitor systems. Applications to communication, automated-measurement, and process-control systems. Semester design project required. Prereq: EE 612; senior standing; programming experience; permission. Lab. 4 cr.

717. Introduction to Digital Image Processing
Digital image representation; elements of digital processing systems; sampling and quantization, image transformation including the Fourier, the Walsh, and the Hough transforms; image enhancement techniques including image smoothing, sharpening, histogram equalization, and pseudo-color processing; image restoration fundamentals. Prereq: EE 645; EE 647; CS 410C or equivalent experience; permission. Lab. 4 cr.

#745. Fundamentals of Acoustics
Acoustic wave equation for air; laws of reflection, refraction, and absorption; characteristics and measurement of acoustical sources; human perception of sound, loudness, intensity; microphones; acoustical materials; problems in environmental sound control; ultrasonics; architectural acoustics. Prereq: PHYS 408; MATH 527; permission. Lab. 4 cr.

757. Fundamentals of Communication Systems
Discussions of deterministic signals, Fourier spectra, random signals and noise, baseband communication, analog and digital modulation schemes, and system signal-to-noise ratio. Prereq: EE 645; 647; permission. Lab. 4 cr.

758. Communication Systems
Design of high-frequency communication systems. RF amplification, modulators for AM and FM systems, receiving techniques, antennas, free-space propagation, propagation characteristics of the ionosphere. Prereq: EE 603; EE 757 or equivalent; permission. Lab. 4 cr.

760. Introduction to Fiber Optics
Basic physical and geometric optics; solution of Maxwell's equations for slab waveguides and cylindrical waveguides, of both step index and graded index profiles; modes of propagation and cutoff; polarization effects; group and phase velocity; ray analysis; losses; fabrication; sources; detectors; couplers; splicing; cabling; applications; system design. Prereq: PHYS 703 or EE 603 or permission. Lab. 4 cr.

761. Optical Engineering
First-order imaging optics, thin and thick lenses, aberrations, mirrors, stops, apertures, gratings, prisms, resolution, interferometry, diffraction, ray tracing, design of optical instruments, image evaluation, modulation transfer function, optical system design by computer. Prereq: PHYS 408; MATH 527; or permission; CS 410C or equivalent experience. Lab. 4 cr.

762. Illumination Engineering
Radiation; spectra, wave and particle nature of light, physics of light production, light sources and circuits, luminaires, science of seeing, color theory, measurements, control of light, light and health, lighting calculations. Open to juniors and seniors in CEPS. Prereq: MATH 527 and PHYS 408. Lab. 4 cr.

#763. Lighting Design and Application
Lighting design process, modeling, interior and exterior lighting calculation and design, flux transfer, form and configuration factors, lighting quantity and aesthetics, daylighting calculations, lighting economics, lighting power and energy analysis, selected applications of light in interior and exterior spaces. Prereq: EE 762. Design lab. 4 cr.

771. Linear Systems and Control
Fundamentals of linear system analysis and design in both continuous and discrete time. Design of feedback control systems. Topics include modeling; time and frequency analysis; Laplace and Z transforms; state variables; root locus; digital and analog servomechanisms; proportional, integral, and derivative controllers. Demonstrations and computer simulations included. Prereq: senior standing in EE or ME or permission. (Also offered as ME 771.) 3 cr.

771H. Linear Systems and Control/Honors
Same topics as EE 771. Honors students will attend an additional one-hour meeting each week. Prereq: senior standing in EE or permission. 4 cr.

772. Control Systems
Extension of EE 771 to include more advanced control system design concepts such as Nyquist analysis; lead-lag compensation; state feedback; parameter sensitivity; controllability; observability; introduction to nonlinear and modern control. Includes interactive computer-aided design and real-time digital control. Prereq: EE 771 or permission. (Also offered as ME 772.) Lab. 4 cr.

775. Applications of Integrated Circuits
Design and construction of linear and nonlinear electronic circuits using existing integrated circuits. Limitations and use of operational amplifiers. Laboratory course in practical applications of nondigital integrated circuit devices. Prereq: EE 652; permission. Lab. 4 cr.

#781. Physical Instrumentation
Analysis and design of instrumentation systems. Sensors, circuits, and devices for measurement and control. Elements of probability and statistics as applied to instrument design and data analysis. Transmission, display, storage, and processing of information. The design, implementation, testing, and evaluation of a relevant instrument system is an integral part of the course. Prereq: senior standing in EE or equivalent; EE 652; and permission. Lab. 4 cr.

784. Biomedical Instrumentation
Principles of physiological and biological instrumentation design including transducers, signal conditioning, recording equipment, and patient safety. Laboratory includes the design and use of instrumentation for monitoring of electrocardiogram, electromyogram, electroencephalogram, pulse, and temperature. Current research topics, such as biotelemetry, ultrasonic diagnosis, and computer applications. Prereq: ZOOL 507-508 or equivalent; EE 652; permission. Lab. 4 cr.

#785. Underwater Acoustics
Vibrations, propagation, reflection, scattering, reverberation, attenuation, sonar equations, ray and mode theory, radiation of sound, transducers, and small- and large-signal considerations. Prereq: permission. 4 cr.

787. Analysis and Design of Human Physiological Control Systems
Analysis and design of human physiological control systems and regulators through the use of mathematical models. Identification and lin-

earization of systems components. Membrane biophysics. Design of feedback systems to control physiological states through the automatic administration of drugs. System interactions, stability, noise, and the relationship of system malfunction to disease. Prereq: ZOOL 507-508 or equivalent; EE 771 or equivalent; and permission. 4 cr.

790. Engineering Design Experience
Capstone engineering design project that draws on previous coursework and involves many of the following features: synthesis, analysis, alternative approaches, modeling, construction, simulation, testing, and evaluation. Designs must consider realistic constraints such as time, economics, safety, reliability, functionality, social and environmental implications, practicality, etc. Oral and written reports required. Normally taken by EE seniors in conjunction with other technical electives or work experience. 0 cr. Cr/F.

795. Electrical Engineering Projects
Laboratory or advanced study course. Students either join a department research project or engage in a project in an area of staff interest. Prereq: acceptance by staff member. 1–4 cr.

795H. Senior Honors Project
Independent analytical or laboratory study under the guidance of a faculty member. A written report is required. Prereq: senior EE honors standing. 4 cr. for 1 semester or 2 cr. for each of 2 semesters.

796. Special Topics in Electrical Engineering
New or specialized courses and/or independent study. Prereq: permission. 1–4 cr.

Engineering Technology (ET)

(For program description, see page 61.)

Chairperson: David A. Forest
Associate Professors: Ralph W. Draper, David A. Forest, Jill Schoof
Assistant Professor: T. A. Parssinen

Permission of instructor is a prerequisite to all engineering technology courses.

633. Business Organization and Law
Corporations; proprietorships; product liability; contracts; federal agencies; commercial paper; conditions of employment; business ethics, bankruptcy; U.C.C. Special fee. 3 cr.

634. Economics of Business Activities
Elementary financial accounting; compound interest and time value of money; sources of capital; cost estimating; depreciation; risk and insurance; personal finance. Prereq: differential and integral calculus. Special fee. 3 cr.

637. Heat and Fluid Power I
Work and heat, first and second laws of thermodynamics, heat engines and refrigerators; applied to various cycles (power plants, turbines, jet engines, etc.). Field trips. Prereq: differential and integral calculus; physics. Lab. 4 cr.

638. Heat and Fluid Power II
Continuation of 637 for MET students only. Further applications of thermodynamics. Additional topics include heat transfer and fluid dynamics. Prereq: ET 637 or equivalent. Lab. 4 cr.

641. Production Systems
Market forecasting; waiting line theory; manufacturing inventories and their control; production scheduling; quality control. Prereq: differential and integral calculus. 3 cr.

644. Mechanical Engineering Technology Concepts in Design and Analysis
Kinematics, kinetics, work and energy, fluids, heat transfer; application of these concepts to problems in mechanical design. Prereq: strength of materials and dynamics and ET 637. 4 cr.

645. Instrumentation
Statistics of experimentation; quantity standards and measurement; design of experiments; use of laboratory gear including dynamometer; field trips. Prereq: differential and integral calculus; ET 644 or equivalent. Lab. 4 cr.

651. Mechanical Engineering Technology Project
Group project; students required to find solutions to actual technological problems in design, fabrication, and testing as posed by industry. Student team defines the problem, prepares a budget, and works with the client company to research, design, build, and test the software and/or hardware needed. Prereq: senior standing. A yearlong course: 4 cr. each semester, 8 cr. total; an IA grade (continuous course) given at the end of first semester. Withdrawal from course results in loss of credit.

662. Illumination Engineering
Radiation; spectra, wave, and particle nature of light; physics of light production, light sources and circuits, luminaires, science of seeing, color theory, measurements, control of light, light and health, lighting calculations. Prereq: calculus and physics. Lab. 4 cr.

663. Lighting Design and Applications
Lighting design process, modeling, interior and exterior lighting calculation and design, flux transfer, form and configuration factors, lighting quality and aesthetics, daylighting calculations, lighting economics, lighting power and energy analysis, selected applications of light in interior and exterior spaces. Prereq: ET 662. Design lab. 4 cr.

671. Digital Systems
Digital systems design and applications using TTL and CMOS devices. Topics include logic design of memory systems and interfacing. Digital design project required. Prereq: introductory digital design. Special fee. Lab. 4 cr.

674. Control Systems and Components
Topics include linear systems analysis, the Laplace transform and its properties, controllers, root locus technique, transient response analysis, first- and second-order systems, error analysis, and control system design. Prereq: differential and integral calculus. Lab. 4 cr.

675. Electrical Technology
Electrical circuits—DC and AC network analysis; power factors, transformers; power supplies. Electronic circuits—diodes, transistors and operational amplifiers. Digital circuits and introduction to computer-aided engineering. Prereq: differential and integral calculus. Lab. 4 cr.

677. Analog Systems
Op amp specifications, instrumentation and bridge amplifiers, advanced op amp circuits and linear ICs. Interfacing techniques, and A/D and D/A converters. Lab applications. Prereq: intro. analog design. Special fee. Lab. 4 cr.

680. Communications and Fields
Topics include Fourier series analysis; the Fourier transform and its properties; convolution; correlation including PN sequences; modulation theory; encoding and decoding of digital data (NRZ-M, NRA-S, RZ, Biphase-L, and Manchester); antennas and antenna pattern; Radar Range Equation; and an introduction to information theory. Prereq: differential and integral calculus. Lab. 4 cr.

683. Advanced Electronic Design Methods
Design methods for analysis and synthesis of state-of-the-art circuits and systems, with real-world examples. A design project will be required. Laboratory work will form an important part of the course. Prereq: intro. analog and digital design. Special fee. 3 cr.

690. Microcomputer Technology
Microprocessors; their operation, programming, interfacing, and various uses. The 8085A is used as an operational model for hardware and software applications. SDK-85 microcomputer development systems are used for lab. Microcomputer applications, with emphasis on lab work. Prereq: ET 671. Special fee. Lab. 4 cr.

691. Electrical Engineering Technology Project
Group project; students are required to find solutions to actual technological problems in design, fabrication, and testing, as posed by industry. Student team defines the problem, prepares a budget, and works with the client company to research, design, build, and test the software and/or hardware needed. Prereq: senior standing. Special fee. A yearlong course: 4 cr. each semester, 8 cr. total; an IA grade (continuous course) given at end of first semester. Withdrawal from course results in loss of credit.

695. Independent Study
A) Topics in Engineering Technology Mathematics; B) Topics in Mechanical Engineering Technology; C) Topics in Electrical Engineering Technology. 1–4 cr.

English (ENGL)

(For program description, see page 28.)

Chairperson: Michael V. DePorte
Professors: Thomas A. Carnicelli, Mary Morris Clark, Michael V. DePorte, Karl C. Diller, Walter F. Eggers, Burt H. Feintuch, Michael K. Ferber, Lester A. Fisher, Melody G. Graulich, Elizabeth H. Hageman, Robert Hapgood, Jean E. Kennard, Rochelle Lieber, Andrew H. Merton, Thomas R. Newkirk, Philip L. Nicoloff, Susan Schibanoff, Patrocinio P. Schweickart, Charles D. Simic, Mark R. Smith, David H. Watters, John A. Yount
Associate Professors: Janet Aikins, Brigitte Gabcke Bailey, Robert J. Connors, Jane T. Harrigan, Susan Margaret Hertz, Romana C. Huk, Lisa Watt MacFarlane, Mekeel McBride, Sarah Way Sherman, Rachel Trubowitz
Assistant Professors: Elizabeth Jane Bellamy, Margaret-Love G. Denman, John Richard Ernest, Diane P. Freedman, James Krasner, Douglas M. Lanier, John S. Lofty, Lisa C. Miller, Ramachandran Sethuraman, Sandhya Shetty, Patricia A. Sullivan

See departmental brochure for detailed descriptions of course offerings.

English 401 is a prerequisite for all English courses but 400.

400. English as a Second Language
Improves the competence of foreign students in listening comprehension, speaking, reading, and writing. Recommended as preparation for ENGL 401. Prereq: student should meet with and have the permission of the instructor. 4 cr.

401. Freshman English
Training to write more skillfully and to read with more appreciation and discernment. Frequent individual conferences for every student. Special fee. 4 cr.

401A. Freshman English for ESL Students
A special section of Freshman English for students whose native language is not English. Training to write more skillfully and to read with more appreciation and discernment, with special attention to the problems of non-native speakers of English. Supplemental work on listening and speaking as necessary. Frequent individual conferences for every student. Special fee. 4 cr.

#403. Introduction to the Study of Literature
The art of thoughtfully enjoying various kinds of literature, the substance and language of literature, and literary techniques. 4 cr.

500. Writing about Reading: Writing About Nonfiction
Emphasis on close reading of a variety of nonfiction sources and on intensive writing to develop interpretive skills. Prereq: ENGL 401 or permission. Special fee. 4 cr.

501. Introduction to Prose Writing
Nonfiction writing; weekly papers and frequent conferences. May be repeated for credit with the approval of department chairpersnn. Special fee. 4 cr.

503. Persuasive Writing
Writing of all types of persuasive nonfiction prose, including argumentative essays and position papers. Special attention to argumentative structures and analysis of audiences. Weekly papers of varying lengths and formats, frequent conferences. Special fee. 4 cr.

505. Introduction to Linguistics
Overview of the study of language: animal communication vs. human language, universal properties of human language, Chomsky's innateness hypothesis, language acquisition in children, dialects and language variation, language change. Includes introduction to modern grammar (phonology, syntax, and semantics) and to scientific linguistic methodology. (Also offered as LING 505.) 4 cr.

#511. Major Writers in English
In-depth study and discussion of a few American and/or British writers. Topics and approaches vary depending on instructors. 4 cr.

#512. Introduction to American Literature
Works of major American writers from Irving to Faulkner, with emphasis on how to adapt and present the material to high school English classes. Open only to English teaching majors. 4 cr. (Not offered every year.)

513, 514. Survey of British Literature
Selected works in poetry and prose considered in chronological order and historical context. Attention to the works and to the ideas and tastes of their periods. 513: *Beowulf* through 18th century. 514: 1800 to the present. 4 cr.

515, 516. A Survey of American Literature
515: From the beginning of American literature to the Civil War. 516: From the Civil War to the present. 4 cr.

517. Introduction to African-American Literature and Culture
An introduction to African-American literature in the context of a variety of cultural perspectives. Course topics may include: major writers, literary genres, historical periods, Harlem Renaissance, Black Arts Movement, fine and folk arts, religion, music, and film. (Also offered as AMST 502.) 4 cr.

#518. The Bible as Literature
Literature of the Old and New Testaments and the Apocrypha, primarily in the King James version. 4 cr.

519. Introduction to Critical Analysis
Critical analysis of fiction, poetry, and drama. Frequent short papers. This course, or 529, is a prerequisite with a minimum grade of C for those intending to declare an English major. Students may not take both ENGL 519 and 529 for credit. 4 cr.

#520. Literature and the History of Ideas
Interdisciplinary study of literary works as influenced and illuminated by the concepts of philosophers, historians, and scientists. Barring duplication of subject, may be repeated for credit. 4 cr.

521. The Nature Writers
Fiction, poetry, and nonfiction books on the natural environment. Such books as Thoreau's *Walden* or *Maine Woods*, Leopold's *Sand County Almanac*, Beston's *Outermost House*, Dillard's *Pilgrim at Tinker Creek*, books by naturalists who observe nature vividly and knowingly and who write out of their concern for the environment. 4 cr.

522. American Literary Folklore
Folktales, songs, proverbs, beliefs, superstitions, and their use by such American authors as Irving, Hawthorne, Longfellow, Melville, Thoreau, Twain, Frost, and Faulkner; some emphasis on oral folk culture of New Hampshire. 4 cr.

#523. Madness in Literature
How various writers depict insanity, and how they approach the problem of determining what attitudes and what behavior are truly sane. Emphasis on 19th- and 20th-century works, but works from earlier periods also considered. Euripides' *The Bacchae*, Shakespeare's *King Lear*, Cervantes's *Don Quixote*, Hoffman's *The Golden Pot*, Dostoevsky's *Notes from the Underground*, Robbe-Grillet's *The Voyeur*, Nabokov's *Pale Fire*, and other texts. 4 cr.

525. Popular Culture in America
Cultural expression in popular media. Verbal arts (best sellers, magazines, newspapers, speeches); some attention to television, film, comics, popular music. The multidisciplinary approach deals with historical context, cultural institutions, and distinctions between "popular arts" and "great literature." Recurrent images, situations, and themes are investigated to see what values are celebrated and fears revealed. 4 cr.

529. Writing about Literature
Close reading of poetry, fiction, and drama. Frequent papers. A prerequisite with a minimum grade of C for those intending to declare an English major. Students may not take both ENGL 519 and 529 for credit. 4 cr.

533. Introduction to Film
The art, history, technology, and theory of the narrative motion picture from the silent period to the present. Examination of films by such filmmakers as Griffith, Keaton, Eisenstein, Renoir, Welles, Hitchcock, Bergman, Kurosawa. (Also offered as CMN 533; students not majoring or minoring in communication must register for ENGL 533.) Special fee. 4 cr.

581. Introduction to Postcolonial Literatures in English
Survey of contemporary Asian, African, and Caribbean fiction, drama, travelogues, essays, and poetry from the 1950s to the present. Introduction to political, historical, and cultural contexts within which these forms are produced. 4 cr.

585. Introduction to Women in Literature
Survey of images of women in literature. Content and approach vary depending on instructor. 4 cr.

586. Introduction to Women Writers
Survey of women writers. Content and approach vary depending on instructor. 4 cr.

595. Literary Topics
Various faculty members investigate topics of special interest at a level appropriate for nonmajors. Past topics have included Irish literature, animals in literature, and literature of the Vietnam War. See department for details of current offerings. 1–4 cr.

605. Introduction to Linguistic Analysis
Introduces analysis methods and problem solving in phonology, morphology, and syntax using data from many languages. Emphasis will be both practical (learning how to describe the grammar and sound system of a language) and theoretical (understanding languages' behavior). Prereq: ENGL/LING 505, or permission. (Also offered as LING 605.) 4 cr.

#607. The American Character: Religion in American Life and Thought
Interdisciplinary study of the American religious experience and its relationship to other aspects of American culture, taught by a team of three specialists, each in a different discipline: American intellectual and cultural history, American literature, and American church history. Central emphasis on several transforming themes of the 19th century and their effects upon the interplay of religion and society. (Also offered as HIST 607, HUMA 607, and RS 607.) 4 cr.

#608. Arts and American Society: Women Writers and Artists, 1850–Present
Team-taught course studying the impact of gender definitions on the lives and works of selected American artists. Considers lesser-known figures such as Fannie Fern, Lilly Martin Spencer, and Mary Hallock Foote as well as better-known artists such as Willa Cather and Georgia O'Keeffe. Prereq: permission or one of the following: WS 401, HIST 566, ENGL 585, 586, 685, 785, or a 600-level art history course. (Also offered as ARTS 608, HIST 608, and HUMA 608.) 4 cr.

#609. Ethnicity in America: The African-American Experience in the Twentieth Century
Team-taught course investigating music, literature, and social history of African-American America in the period of the Harlem Renaissance, in the Great Depression, World War II, and in the 1960s. Special attention to the theme of accommodation with and rejection of dominant white culture. (Also offered as HUMA 609 and MUSI 609.) 4 cr.

#610. Regional Studies in America: New England Culture in Changing Times
Team-taught course investigating some of the major contributions New England has made to American life. Focusing on three periods: the Puritan era, 1620–90; the Transcendental period, 1830–60; and the period of emerging industrialism in the late 19th century. (Also offered as ARTS 610, HIST 610, and HUMA 610.) Not for art studio major credit. 4 cr.

616. Studies in Film
Advanced, focused study of the cinema. Topics vary from year to year and with instructor. Focus may range from general consideration of film theory, film criticism, and film history, to specific analyses of selected genres, directors, and periods. (Also offered as CMN 616; students majoring or minoring in communication must register for CMN 616.) Prereq: ENGL/CMN 533 or permission. Special fee. 4 cr.

619. Critical Approaches to Literature
Selected methods of literary criticism applied to fiction, poetry, and/or drama with critical approaches varying from year to year. A follow-up of 519, course provides a second semester of training in critical reading and writing, examining such major modern strategies as formalist, biographical, archetypal, psychological, sociological, historical, feminist, and structuralist criticism. Prereq: ENGL 519, 529, or equivalent. 4 cr.

621. Newswriting
Workshops to develop reporting and writing skills. Prereq: ENGL 501 or equivalent; written permission. May be repeated for credit with the approval of the department chairperson. Special fee. 4 cr.

623. Essay Writing
Intensive writing course emphasizing experimentation with a variety of essay forms. Also reading and discussion of contemporary essays. Prereq: ENGL 501 and written permission of instructor. Special fee. 4 cr.

625, 626. Writing Fiction
Workshop in the fundamental techniques of fiction writing. Student work is criticized by fellow students; individual conferences with instructor. Prereq: ENGL 501 or equivalent. Written permission of instructor required for registration. May be repeated for credit with the approval of the department chairperson. Special fee. 4 cr.

627, 628. Writing Poetry
Workshop in the fundamental techniques of poetry writing. Class discussion and criticism of poems written by students. Individual conferences with instructor. Prereq: ENGL 501 or equivalent. Written permission of instructor required for registration. May be repeated for credit with the approval of the department chairperson. Special fee. 4 cr.

630. Poetry
American and British poetry. Various poetic techniques and their demonstration. See course descriptions available in department office for further information. 4 cr. (Not offered each semester.)

631. The Drama
Nature and types of drama illustrated by major English, American, and (translated) European plays. How to read a play. Live and filmed performances studied as available. 4 cr.

632. Fiction
Modern novels and/or short stories. The ways in which fiction communicates its meanings; the tools and methods at the fiction writer's disposal, primarily as they function in individual works. See course descriptions available in department office for further information. 4 cr. (Not offered each semester.)

649. Studies in British Literature and Culture
Special topics in British studies, varying from year to year. 4 cr. (Not offered every year.)

650. Studies in American Literature and Culture
Special topics in American studies, varying from year to year. 4 cr. (Not offered every year.)

651, #652. Comparative Literature
Comparative studies of major authors representative of important periods of world literary achievement. 651: Homer to Dante; common themes and the development of the epic tradition in early Western literature. 652: Renaissance to modern. Topics and approaches vary from semester to semester. 4 cr.

655. Chaucer
Study of Chaucer's earlier works in the context of their continental sources and analogues. All readings in translation. 4 cr.

657. Shakespeare
Ten major plays representative of the main periods of Shakespeare's career and the main types of drama which he wrote (tragedy, comedy, history). Live and filmed performances included as available. Restricted to undergraduates and designed for both English majors and students majoring in other fields. 4 cr.

681. Introduction to African Literatures in English
In-depth study of writers, literary movements, political contexts, and historical pressures that have shaped and continue to shape African literatures in the colonial and postcolonial periods. Primary focus on Anglophone texts but possibly some literature in translation. 4 cr.

685. Women's Literary Traditions
Intensive study of theme, topics, and techniques in women's literature. Topics vary from year to year. 4 cr.

690. Introduction to African-American Literature in America
Selected prose, fiction, drama, and poetry. Individual works and historical-cultural background. Course varies from year to year. 4 cr.

693, 694. Special Topics in Literature
A) Old English Literature; B) Medieval Literature; C) 16th Century; D) 17th Century; E) 18th Century; F) English Romantic Period; G) Victorian Period, H) 20th Century; I) Drama; J) Novel; K) Poetry; L) Nonfiction; M) American Literature; N) A Literary Problem; O) Literature of the Renaissance. The precise topics and methods of each section vary. Barring duplication of subject, course may be repeated for credit. For details, see course descriptions available in the English department. 4 cr. (Not offered every year.)

695, 696. Senior Honors
Open to senior English majors who, in the opinion of the department, have demonstrated the capacity to do superior work; permission required. An honors project consists of supervised research leading to a substantial thesis or the writing of poetry or fiction portfolio. Required of students in the honors in major program. 4 cr. (Not offered every year.)

697, 698. English Major Seminar
Intensive study of specialized topics that vary from year to year. Enrollment in each seminar is limited to 15 so that all students can take an active part in discussion and work closely with the instructor on their papers. Prereq: a grade of B or better in ENGL 519 or 529, and permission. For details, see course description available in the department office. 4 cr.

701. Advanced Writing of Fiction
Workshop discussion of advanced writing problems and readings of students' fiction. Individual conferences with instructor. Prereq: 625, 626, or equivalent; written permission of instructor required for registration. May be repeated for credit with the approval of the department chairperson. Special fee. 4 cr.

703, 704. Advanced Nonfiction Writing
Workshop course for students intending to write publishable magazine articles or nonfiction books. Equal stress on research and writing techniques. Prereq: ENGL 621; 722 recommended. Written permission of instructor required. May be repeated for credit with the approval of the department chairperson. Special fee. 4 cr.

705. Advanced Writing of Poetry
Workshop discussion of advanced writing problems and submitted poems. Individual conferences with instructor. Prereq: ENGL 627, 628 or equivalent; written permission of instructor. May be repeated for credit with the approval of the department chairperson. Special fee. 4 cr.

707. Form and Theory of Fiction
A writer's view of the forms, techniques, and theories of fiction. The novels, short stories, and works of criticism studied vary, depending on the instructor. 4 cr.

708. Form and Theory of Nonfiction
A writer's view of contemporary nonfiction emphasizing the choices the writer faces in the process of research and writing. 4 cr. (Not offered every year.)

709. Form and Theory of Poetry
A writer's view of the problems, traditions, and structures of poetry. 4 cr.

710. Teaching Writing
Introduction to various methods of teaching writing. Combines a review of theories, methods, and texts with direct observation of teaching practice. 2 or 4 cr.

711. Editing
Emphasis on newspaper editing but principles applicable to magazine and book editing also covered. Prereq: ENGL 621; permission. Special fee. 4 cr.

713, 714. Literary Criticism
Major critics from Plato to the present; the chief critical approaches to literature. 4 cr. (Not offered every year.)

715. TESL: Theory and Methods
How linguistic, psychological, sociological, and neurological theory influence or even determine the choice of methods of language teaching. Research on second language acquisition and bilingualism, language aptitude, and the cultural context of language acquisition. Introduction to standard and exotic methods of language teaching. 4 cr.

716. Curriculum Design, Materials, and Testing in English as a Second Language
Study of the problems in designing an effective teaching program for various types of ESL students. Competence and aptitude testing; choosing and adapting materials for ESL classes. 4 cr.

#718. English Linguistics and Literature
Introduction to linguistics for students of literature. Includes a survey of the grammar of English (phonology, morphology, syntax, dialect variation, historical change) with applications to the analysis of the language of poetry and prose. 4 cr. (Not offered every year.)

720. Newspaper Internship
Students intending to pursue careers in journalism spend a semester working full or part time for a daily newspaper under close supervision of editors. Reporting is stressed, but students may do some editing as well. The number of internships is very limited. Prereq: ENGL 621 or its equivalent; permission. Special fee. 4–16 cr.

721. Advanced Reporting
Students learn advanced techniques for developing story ideas and acquiring information from people and documents. Discussion of legal and ethical issues facing reporters. Prereq: ENGL 621 and written permission. Special fee. 4 cr.

722. Feature Writing
Students refine interviewing, reporting, and writing techniques. Emphasis on in-depth features. Prereq: ENGL 621; permission of instructor. May be repeated for credit with the approval of department chairperson. Special fee. 4 cr.

732. Folklore and Folklife
Examines the materials and methods used to study folklore and folklife, emphasizing the historical context and development of folklore studies in North America and Europe, field research, performance theory, and other topics. 4 cr.

739. American Indian Literature
Close study of traditional and/or contemporary American Indian literature and folklore with historical and cultural background. 4 cr.

741. Literature of Early America
Prose and poetry of the periods of exploration, colonization, early nationalism, Puritanism, Enlightenment. Individual works and historical-cultural background. 4 cr. (Not offered every year.)

742. American Literature, 1815–1865
Fiction, nonfiction, and poetry in the period of romanticism, transcendentalism, nationalism. Individual works and cultural background. 4 cr. (Not offered every year.)

743. American Literature, 1865–1915
Fiction, nonfiction, and poetry in the period of realism, naturalism, industrialism, big money. Individual works and cultural background. 4 cr.

744. American Literature, 1915–1945
Fiction, poetry, and drama in the period of avant-garde and leftism, jazz age, and depression. Individual works and cultural background. 4 cr.

745. Contemporary American Literature
A gathering of forms, figures, and movements since 1945. Individual works and cultural background. 4 cr.

746. Studies in American Drama
Topics vary from year to year. Examples: 20th-century American drama; contemporary playwrights; theatricality in American life. 4 cr. (Not offered every year.)

747. Studies in American Poetry
Topics vary from year to year. Examples: poets of the open road; Pound and his followers; major American poets; contemporary American poetry. 4 cr. (Not offered every year.)

748. Studies in American Fiction
Topics vary from year to year. Examples: the romance in America; the short story; realism and naturalism; the city novel; fiction of the thirties. 4 cr.

749. Major American Authors
Intensive study of two or three writers. Examples: Melville and Faulkner; Fuller, Emerson, and Thoreau; James and Wharton; Dickinson and Frost. 4 cr.

750. Special Studies in American Literature
Topics vary from year to year. Examples: the Puritan heritage; ethnic literatures in America; landscape in American literature; five American lives; pragmatism; American humor; transcendentalism; women regionalists. 4 cr.

751. Medieval Epic and Romance
The two major types of medieval narrative; comparative study of works from England, France, Germany, and Iceland including *Beowulf*, *Song of Roland*, *Niebelungenlied*, Gottfried's *Tristan*, Njal's *Saga*, and Malory's *Morte d'Arthur*. All works read in modern English translations. 4 cr. (Not offered every year.)

752. History of the English Language
Evolution of English from the Anglo-Saxon period to the present day. Relations between linguistic change and literary style. 4 cr. (Not offered every year.)

753. Old English
Introduction to Old English language and literature through the readings of selected poetry and prose. 4 cr.

754. Beowulf
A reading of the poem and an introduction to the scholarship. Prereq: ENGL 753. 4 cr.

#755, 756. Chaucer
755: Troilus and Criseyde, in the context of medieval continental literature by Boccaccio and other influences. 756: The Canterbury Tales in its original language. 4 cr.

758. Shakespeare
A few plays studied intensively. Live and filmed performances included as available. 4 cr.

759. Milton
Milton and his age. Generous selection of Milton's prose and poetry, with secondary readings of his sources and contemporaries. 4 cr. (Not offered every year.)

763. Continental Backgrounds of the English Renaissance
Major philosophers, artists, and writers of the continental Renaissance (in translation): Petrarch, Ficino, Pico, Vives, Valla, Castiglione, Machiavelli, Luther, Calvin, Rabelais, Montaigne, Cervantes, Erasmus, and Thomas More, as representative of the early English Renaissance. 4 cr. (Not offered every year.)

764. Prose and Poetry of the Elizabethans
Shakespeare and his contemporaries. Major works, including Spenser's *Faerie Queene*, Sidney's *Astrophil and Stella*, and Shakespeare's *Sonnets*: their literary and intellectual backgrounds. 4 cr. (Not offered every year.)

765. English Literature in the 17th Century
Major writers of the 17th century, including Donne, Jonson, Herbert, Bacon, and Hobbes. 4 cr. (Not offered every year.)

767, #768. Literature of the Restoration and 18th Century
Representative works; texts studied closely; the ways they reflect the central intellectual problems of their age. 767: Dryden, Rochester, Restoration plays, Bunyan, Defoe, Montesquieu, and Swift. 768: Pope, Fielding, Johnson, Boswell, Voltaire, Sterne, Rousseau, Beckford, Diderot, and Blake. 4 cr.

#769, 770. The English Romantic Period
Major literary trends and authors, 1798 to 1832. Focus on poetry but attention also to prose works and critical theories. 769: Wordsworth, Coleridge, Lamb, Hazlitt, DeQuincey; 770: Byron, Shelley, Keats. 4 cr. (Nnt offered every year.)

771. Victorian Prose and Poetry
Major writers; social and cultural history. Selections vary from year to year. Special fee. 4 cr. (Not offered every year.)

773, 774. British Literature of the 20th Century
Poets and novelists of the mndernist and postmodernist periods. 773: W. B. Yeats, James Joyce, Virginia Woolf, E. M Forster, D. H. Lawrence, and other modernists. 774: a selection of post-modernist or contemporary writers, such as William Golding, Doris Lessing, John Fowles, Philip Larkin, Seamus Heaney, Margaret Drabble, and others. 4 cr.

#775. Irish Literature
Survey from the beginnings to present; works in Irish (read in translation) such as *The Cattle Raid of Cooley*, medieval lyrics, and *Mad Sweeney*; and works in English from Swift to the present. 20th-century authors: Joyce, Yeats, Synge, O'Casey, Beckett, and Flann O'Brien. 4 cr. (Not offered every year.)

#778. Brain and Language
Introduction to neurolinguistics, a study of how language is related to the structure of the brain. Biological foundations of linguistic universals and language acquisition. Examination of evidence from aphasia and from normal language use. 4 cr.

779. Linguistic Field Methods
Study of a non–Indo-European language by eliciting examples from an informant, rather than from written descriptions of the language. Students learn how to figure out the grammar of a language from raw data. Prereq: ENGL/LING 505. (Also offered as LING 779.) 4 cr. (Not offered every year.)

780. English Drama to 1640
Development of the drama through the Renaissance, emphasizing the Elizabethan and Jacobean dramatists. 4 cr.

#781. English Drama, 1660–1780
Representative plays, both serious and comic, by such writers as Wycherly, Congreve, Etherege, Goldsmith, Sheridan, Davenant, Dryden, Otway, Rowe, and Lillo. 4 cr.

782. Modern Drama
Major English, American, and (translated) European plays of the modern period by such playwrights as Shaw, Ibsen, Chekhov, Strindberg, Pirandello, O'Neill, Brecht, Beckett, Williams, Miller, Pinter. Live and filmed performances studied as available. 4 cr. (Not offered every year.)

783. The English Novel of the 18th Century
Rise and development of the novel through study of selected major works by Defoe, Richardson, Fielding, Smollett, Sterne, and Austen. 4 cr.

784. The English Novel of the 19th Century
Representative novels from among Austen, Scott, Dickens, Thackeray, Emily Brontë, Charlotte Brontë, Trollope, George Eliot, Hardy, and Conrad. 4 cr.

785. Major Women Writers
Intensive study of one or more women writers. Selections vary from year to year. 4 cr.

786. Twentieth-Century British Fiction
Traces the development of the novel from the turn of the century to the present day. Representative novels by Lawrence, Joyce, Conrad, Woolf, West, Forester, Huxley, Waugh, Murdoch, Burgess, and Lessing. 4 cr.

#790. Special Topics in Linguistic Theory
Advanced course on a topic chosen by the instructor. Inquire at the English department office for a full course description each time the course is offered. Topics such as word formation, dialectology, linguistic theory and language acquisition, history of linguistics, language and culture, cross-disciplinary studies relating to linguistics. Barring duplication of subject, may be repeated for credit. (Also offered as LING 790.) 4 cr.

791. English Grammar
Survey of the grammar of English (pronunciation, vocabulary, sentence structure, punctuation, dialect variation, historical change) with special attention to the distinction between descriptive and prescriptive grammar and to the problems students have with formal expository writing. 4 cr.

792. Teaching Secondary School English
Methods of teaching language, composition, and literature in grades 7–12. Required of all students in the English teaching major. Open to others with permission. 4 cr.

793. Phonetics and Phonology
The sound system of English and other languages as viewed from the standpoint of modern linguistic theory, including the following topics: the acoustic and articulatory properties of speech sounds, the phonemic repertoires of particular languages, phonological derivations, and prosodic phenomena such as stress and intonation. (Also offered as LING 793.) Prereq: a basic linguistics course or permission. 4 cr.

794. Syntax and Semantic Theory
Relationship of grammar and meaning as viewed from the standpoint of modern linguistic theory. Emphasis on the syntax and semantics of English, with special attention to the construction of arguments for or against particular analyses. (Also offered as LING 794.) Prereq: a basic linguistics course or permission. 4 cr.

795. Independent Study
Open to highly qualified juniors and seniors. Tn be elected only with permission of the department chairperson and of the supervising faculty member or members. Barring duplication of subject, may be repeated for credit up to a maximum of 16 credits. 1–16 cr.

797, 798. Special Studies in Literature
A) Old English Literature; B) Medieval Literature; C) 16th Century; D) 17th Century; E) 18th Century; F) English Romantic Period; G) Victorian Period; H) 20th Century; I) Drama; J) Novel; K) Poetry; L) Nonfiction; M) American Literature; N) A Literary Problem; O) Literature nf the Renaissance. The precise topics and methods of each section vary. Barring duplication of subject, may be repeated for credit. For details, see the course descriptions available in the English department. 2–6 cr.

Entomology (ENTO)

(For program description, see page 45.)

Chairperson: Paul C. Johnson
Professors: James S. Bowman, John F. Burger, R. Marcel Reeves
Associate Professors: Donald S. Chandler, Paul C. Johnson
Adjunct Assistant Professor: Siegfried E. Thewke

400. Insects and Society
Insects and their relations to humans, their environment, and their activities. Not for major credit. Special fee. Lab. 4 cr.

402. Introductory Entomology
Insect structure and function, development, classification, ecology, behavior, and evolution for students in the biological sciences; importance of insects in terrestrial and aquatic ecosystems. Insect collection required. Special fee. Lab. 4 cr.

503. Principles of Applied Entomology
Nature of destructive and beneficial insects and the fundamentals of insect pest management in our modern society. Introduction to the principal arthropod pests of New England associated with the major commodity groups, including structures, ornamentals, and turf. Elective for sophomores, juniors, and seniors. Special fee. 4 cr. (Not offered every year.)

505. Beekeeping
Anatomy, physiology, and social behavior of the honeybee. Commercial beekeeping, including control of diseases and parasites. Special fee. 4 cr. (Not offered every year.)

506. Forest Entomology
Especially for forest resources majors. Structure, development, classification, and control of representative forest insects. Insect collection required. Special fee. Lab. 4 cr. (Not offered every year.)

695. Problems in Entomology
Problems and independent investigations in the various fields of basic and applied entomology. Prereq: ENTO 402 or 503 or permission. 2–4 cr.

704. Medical Entomology
Survey of past and present trends in arthropod-borne diseases transmitted to human populations, emphasizing dynamics of arthropod-host-pathogen/parasite relationships, natural nidality of disease, and role of arthropods and other animals as reservoirs or vectors of disease and maintenance of zoonoses. Lab emphasizes survey of arthropod groups important as disease vectors or envenomizers of humans. Elective for juniors and seniors. Lab. 4 cr. (Not offered every year.)

705. Systematics and Taxonomy of Insects
The kinds and diversity of insects and their relationships, emphasizing methods of species and population analysis, concepts of classification and nomenclature, and application to identification. Prereq: ENTO 402; ZOOL 412 or BIOL 411-412;/or permission. Lab. 4 cr. (Not offered every year.)

706. Terrestrial Arthropods
Biology, ecology, and systematics of the principal terrestrial arthropods, with emphasis on forest and grassland communities. Role of arthropods in decomposition and nutrient cycling; effects of forestry and agricultural practices on fauna. Collection, extraction, identification, and experimental procedures. Two lectures, one lab/fieldwork, and discussions. Prereq: permission. (Also offered as FOR 706.) 4 cr. (Not offered every year.)

709. Aquatic Insect Ecology
Biology, ecology, and taxonomy of aquatic insects, including their role in succession and food webs of aquatic ecosystems, origin and evolution of adaptations to aquatic environments and relationship between habitat type and faunal diversity. Lab emphasizes qualitative and semiquantitative sampling techniques, collection and identification of principal aquatic groups. Prereq: ENTO 402, ZOOL 412, or BIOL 411-412; permission. Lab. 4 cr. (Not offered every year.)

710. Insect Morphology
Study of homology of insect structure with that of other arthropods using evolutionary morphology approach. Integration of external and internal anatomy in delineating relationships within the Insecta and Arthropoda. Prereq: permission. Special fee. 4 cr. (Not offered every year.)

721. Principles of Biological Control
Natural and applied aspects of biological control of insect and plant pests. Prereq: permission. 4 cr. (Not offered every year.)

725. Insect Ecology
Role of insects in coevolution of plant-herbivores and predator/parasite-prey systems, ecosystem energetics, population dynamics, niche theory, competition, coexistence, diversity, and stability. Prereq: permission. 4 cr. (Not offered every year.)

726. Integrated Pest Management
Integration of pest management techniques involving biological, cultural, and chemical control with principles of ecology into management approaches for pests. Prereq: permission. 4 cr.

#799. Honors Senior Thesis
Students conduct an individually designed research project under the direction of an honors thesis committee. The research should address a real issue in entomology related to students' interests and should result in a written thesis that is defended in an oral presentation to members of the committee. Restricted to seniors seeking honors in major. Prereq: permission. 4 cr.

Environmental Conservation (EC)

Department of Natural Resources
(For program description, see page 45; for faculty listing, see page 159; see also course listings under Forestry, Natural Resources, Soil Science, Water Resources Management, and Wildlife Management.)

501. Environmental Philosophy
Provides a grounding in philosophical and social theory underlying environmental studies and approaches to environmental conservation. Students conduct critiques of extensive readings and write papers creatively analyzing aspects of selected philosophical works. Major research manuscript required. 4 cr.

502. Conservation Biology Forum
Introduction to conservation biology and issues of loss in species diversity. Study of the biology of human-caused extinction. Discussion of current events and their relation to loss in diversity. 2 cr.

503. Wetlands Resources
Examination of coastal and adjacent freshwater and estuarine wetlands from historical, destruction, and preservation perspectives. Field trips and laboratory sessions emphasize succession and investigation of dominant plant, insect, and vertebrate associations. Daily and evening lectures, labs, and fieldwork. Prereq: one full year of college-level biology. 2 cr. (Offered summers at the Shoals Marine Laboratory.)

595, 596. Problems in Natural and Environmental Resources
Students pursue field, laboratory, or library problems in natural and environmental resources that are not covered by other courses. A faculty consultant and a study topic must be chosen before registration for the course. In consultation with the faculty adviser, students select the problem area, create a bibliography for reflection, and find channels to actively pursue the topic. A professionally written paper is expected at termination of the study. May be repeated once for credit. Prereq: permission. 2–4 cr.

601. Environmental Conservation Internship
Practical internship and field experience in a location removed from the University milieu to give the environmental conservation student a dimension and insight into sustainable resource management systems not available in the campus experience. Prereq: EC majors only. 4 cr. Cr/F.

610. Coastal and Oceanic Law and Policy
Intended for students interested in careers in marine or coastal resources management, or in the natural sciences. Includes law and policy related to ocean dumping, marine sanctuaries, environmental impact statements, water and air pollution, fisheries management, offshore gas and oil production, and territorial jurisdiction. Lectures on the status and history of laws are accompanied by discussions of relevant policy and the efficacy of various legal techniques. A

case study, requiring extensive use of the laboratory's library and personnel, is assigned. 2 cr. (Offered summers at the Shoals Marine Laboratory.)

635. Contemporary Conservation Issues
How human technology causes biological and social conflicts when applied to the ecosystem; multiple demands of game, timber, water, minerals, and soil ecosystems vs. economic growth. Not open to freshmen. 4 cr.

637. Practicum in Environmental Conservation
Independent participation in an environmental conservation activity in the area of the student's specialization. Individual or group projects may be developed under the supervision of any faculty member within or outside natural resources or with supervisors in public and private agencies, upon approval of the course instructor. Research projects not acceptable. Prereq: senior standing in the environmental conservation program. Lab. 4 cr. Cr/F.

695. Special Topics in Environmental Conservation
Topics may include environmental and natural resource policy; environmental diplomacy; the application of ethics, values, and philosophy to environmental conservation, agriculture, and related areas. Seminar format. Prereq: permission. 1–3 cr. Cr/F.

710. Environmental History
History of ideas, beliefs, values, and actions regarding the environment and the socioeconomic matrix within which they lie, with special reference to the American experience. Prereq: senior/junior standing in the environmental conservation program. 4 cr.

718. Law of Natural Resources and Environment
For resource managers: the legal system pertaining to resource management, protection of the environment, and possibilities for future action. Prereq: EC 635, RECO 606, or equivalent. 3 cr.

799. Senior Thesis and Seminar
Writing and completion of a senior thesis synthesizing the environmental conservation undergraduate experience, supported by a weekly seminar with all thesis writers. Prereq: majors only, senior standing. 4 cr. Cr/F.

Environmental Engineering

(See pages 54 and 57.)

Family Studies (FS)

(For program description, see page 68.)

Chairperson: Larry J. Hansen
Associate Professors: Kristine M. Baber, Elizabeth M. Dolan, Larry J. Hansen, Michael F. Kalinowski, Victor R. Messier
Assistant Professors: Walter L. Ellis, Nancy K. File, Barbara R. Frankel, Li-ying Hilary Tso
Adjunct Instructor: MaryJane Moran

455. Introduction to Consumer Studies
Survey of consumer studies. Introduction to consumer decision making, consumer problems, consumer protection. 4 cr.

525. Human Development
Development information from conception through death; theoretical perspectives and research methods in human development; emphasis on student's communication and analytical skills. 4 cr.

553. Personal and Family Finance
Applied financial management; allocation of income to maximize wealth. Topics include banking, investments, credit, insurance. 4 cr.

555. Management and Decision Making
Theories of management, information processing, and decision making in the allocation of resources. 4 cr.

#556. Housing and Design
Housing examined in terms of design, physical, sociopsychological, and community needs. 4 cr. (Not offered every year.)

615. Field Experience
Work with agency, institution, or organization concerned with the welfare of families and individuals. Students plan with department adviser and apply for approval. Prereq: approval of departmental faculty. 1–6 cr.

623. Developmental Perspectives on Infancy and Early Childhood
Integrative view of the developing child from conception through childhood within the family context. Prereq: FS 525. 4 cr. (Fall semester only.)

624. Developmental Perspectives on Adolescence and Early Adulthood
Developmental information from pubescence through early adulthood; the concept of identity and influences on identity formation. 4 cr.

635. Learning in Child Development Settings
Current theoretical approaches to communicating with children and influencing their behavior. Weekly four-hour laboratory experience working with preschool children is required at UNH Child and Family Center. Weekly three-hour seminar. Prereq. FS 525; permission. 4 cr.

645. Family Relations
Theories and research relating to the family and its role in individual development. 4 cr.

653. Consumer Problems
Examination of contemporary problems confronting consumers. 4 cr.

654. Consumer Protection
Types of protection available to consumer. Agencies that have consumer mandates, the laws pertaining to them, their functioning, and their effectiveness. 4 cr.

664. Consumer Behavior
Survey of consumer behavior theory and research from economic, psychological, and sociological perspectives. Examination of the effects of business, marketing, and advertising strategies on purchase decisions. 4 cr.

695. Independent Study
Scholarly project in the area of child, family, and consumer studies. Regular conferences with supervising faculty required. Prereq: approval of departmental faculty. 1–6 cr.

707. Practicum
Supervised in-depth experience in teaching, research, or advocacy in a professional setting to increase the student's understanding of children, families, or consumer issues. A) Child; B) Family; C) Consumer Studies. Prereq: FS major; permission. 1–6 cr. Cr/F.

708. Child and Family Center Internship
Supervised position within the UNH Child and Family Center nursery school programs: a) videotape assistant; b) assessment assistant; c) toddler program assistant; d) assistant for three- to five-year-olds; e) computer technology assistant; f) international perspectives assistant. May be repeated up to a total of 9 credits. Prereq: FS 635; permission. 1–6 cr. Cr/F.

709. Child Study and Development Center Internship
Supervised positions within the UNH Child Study and Development Center child care programs: a) videotape assistant; b) assessment assistant; c) infant assistant; d) toddler assistant; e) assistant for three- to five-year-olds; f) computer technology assistant; g) international perspectives assistant; h) health issues assistant. May be repeated up to a total of 9 credits. Prereq: FS 635; permission. 1–6 cr. Cr/F.

733. Supervising Programs for Young Children
Philosophical bases and theoretical rationales of various programs for young children; program alternatives and resources; issues in administration including supervision, finances, and regulations. Prereq: permission. 4 cr. (Fall semester only.)

734. Curriculum for Young Children
Designing and implementing developmentally appropriate activities for young children; assessing the effectiveness of activities; evaluating materials and equipment. Prereq: FS 525; 623; 635; permission. 4 cr. (Spring semester only.)

741. Marital and Family Therapy
Introduction to the theory and practice of marital and family therapy. Major approaches to be examined include strategic, transgenerational, structural, experiential/humanis-

tic, and behavioral. Prereq: FS 645 or equivalent; permission. 4 cr.

743. Parents, Children, and Professionals
Exploration of professional roles related to child and family advocacy. Consideration of philosophical, ethical, and pragmatic issues in the helping professions; evaluation and design of advocacy programs. Prereq: permission. 4 cr. (Fall semester only.)

746. Human Sexuality
Investigation of physiological, psychological, and sociological aspects of human sexuality. Particular attention to various social practices, policies, and programs that affect sexual attitudes and behaviors. Prereq: permission. 4 cr.

753. Family Economics
Impact of economic change on families, family income, and resource allocation. Prereq: FS 645; one course in economics; permission. 4 cr.

754. Consumers in Society
Problems and issues facing selected groups of consumers: the elderly, the poor, children and adolescents, women, and others. Prereq: permission. 4 cr.

782. Family Internship
Supervised experience working in social, legal, and marketplace settings that offer services to families. Students spend a minimum of 20 hours per week in a selected community program. Admission by application only. Applications due prior to preregistration fall semester of the senior year. Prereq: FS major; FS 525; 555; 645; 20 additional credits in major courses; permission. Coreq: FS 792. 8 cr. Cr/F. (Spring semester only.)

785-786. Seminar for Student Teachers
These seminars supplement the student teaching experience and effect a transition to the profession of teaching for those students admitted to the early childhood certification option. 2 cr.

788. Student Teaching of Young Children
Supervised teaching experience. Students spend a minimum of 20 hours per week in a selected program for young children working with a cooperating teacher. Students must apply during the spring semester of their junior year. Prereq: FS major; FS 525; 623; 635; 645; 733; 734; 743; EDUC 706; PHED 675; THEA 520; MATH 621; permission. Coreq: FS 785-786. 8 cr. Cr/F. (Spring semester only.)

792. Seminar for Family Interns
This weekly seminar focuses on issues of concern to family internship students, provides advanced training in educational strategies for working with families, and develops students' professional skills. Prereq: admission to family internship program. Coreq: FS 782. 4 cr. (Spring semester only.)

794. Families and the Law
Exploration of laws affecting families and the interaction of family members with each other and with society. Prereq: FS 555; 645; permission of instructor. 4 cr.

797. Special Topics
Highly focused examination of a particular theoretical, methodological, or policy issue. Prereq: permission. 4 cr.

799. Honors Senior Thesis
Under direction of a faculty sponsor, students plan and carry out an independent investigative effort in an area of family, child, and/or consumer studies, resulting in a written thesis and an oral presentation before students and faculty. Prereq: majors only; senior standing; permission. Two-semester sequence as continuing course. 2–4 cr.

Forestry (FOR)

Department of Natural Resources
(For program description, see page 46; see also course listings under Environmental Conservation, Natural Resources, Soil Science, Water Resources Management, and Wildlife Management. For a listing of the faculty, see under Natural Resources.)

423. Dendrology
North American forest trees; taxonomy, silvical characteristics, community relationships; major forest regions. Restricted to NR majors; others by permission. Coreq: FOR 425. 2 cr.

425. Field Identification of Trees and Shrubs
Identification and nomenclature of important North American trees; emphasis on trees and associated woody species of the Northeast. Coreq: 423. Special fee. Lab. 2 cr.

426. Wood Science and Technology
Wood microstructure and identification: physical, chemical, and mechanical properties; characteristics of wood including those produced by growth and form (i.e., knots, cross-grain) and those produced by degradation (i.e., stain, decay); log and lumber processing and quality evaluation; preparation of wood for use, including drying, gluing, and protection against degradation. Special fee. Lab. 4 cr.

500. Summer Work Experience
Work in forestry or closely related field; must be performed under professional supervision or approved by natural resources faculty. Students are responsible for arranging their own experience. (Forestry majors only.) May be repeated. 0 cr. Cr/F.

501. Working with Forests
Integrated study of scientific, technical, administrative, and social elements of forest resource management. Emphasis on tree identification, measurement, and protection techniques. Of interest to students in unrelated as well as related fields. Not open to forestry majors. Special fee. Lab. 4 cr.

502. The Endangered Forests
Discussion of the two major international problems in forestry: dying of forests due to air pollution in developed countries; and loss of forests due to clearing and heavy cutting in tropical countries. The value of forests and their importance to people. Guest speakers and field trip. Special fee. 4 cr.

527. Forest Ecology
Application of general ecological principles to the study of forests; examination of the forest from the level of the individual tree to the forest community; consideration of the impact of forest management on ecosystem structure and function. Prereq: PBIO 412 or equivalent. (Open only to EC, FOR, PBIO, SOIL, WARM, and WILD majors.) Special fee. Lab. 4 cr.

542. Forestland Measurement and Mapping
Elementary measuring equipment and techniques; preparation of maps; public land survey; courthouse deed search. Two-week field session following spring semester. (FOR, WARM, and WILD majors only.) Special fee. 2 cr.

544. Forest Biometrics
Sampling techniques basic to forest inventory, regression estimation used in deriving volume equations and predicting forest growth and yield. Field labs include plot and point sampling. Analyses made using microcomputers. Special fee. Lab. 3 cr.

#581. Methods in Land Surveying
Principles and field methods of land surveying for the natural resource manager; measurement of distance, direction, and elevation; instrumentation and computation; legal aspects of land description and boundary. Prereq: FOR 542 or permission. Lab. 4 cr. (Not offered every year.)

629. Silviculture
Application of ecological knowledge to the control, establishment, composition, and growth of forest stands for economic purposes. Prereq: FOR 423 and 527. Special fee. Lab. 3 cr.

630. Forest Harvesting and Silviculture
Harvesting and silvicultural practices. Prereq: FOR 629 or permission. Limited enrollment. 2 cr. Cr/F.

643. Economics of Forestry
Intermediate-level analyses of supply and demand for forest-based goods and services, managerial economics, taxation, capital investments. Prereq: RECO 411 or ECON 402. 4 cr.

652. Forest Resources Assessment
Aerial photo type mapping and forest resources inventory: type identification and delineation, map construction, cruise design, and forest resources inventory. Two-week field session following spring semester. (Natural resources majors, others by permission.) Prereq: FOR 527 and 544. Special fee. 2 cr.

660. Forest Fire Protection
Forest fire prevention, behavior, and effective control; weather phenomena; other aspects of forest damage; fire effects and use. Prereq: FOR 527 or 629; SOIL 501. Special fee. Lab. 2 cr.

695. Investigations in Forestry
A) Forest Ecology; B) Remote Sensing; C) Wood Products; D) Mensuration; E) Forest Economics;

F) Forest Management; G) Decision Science; H) Recreation; I) Policy; J) Forest Genetics; K) Watershed Management; L) Natural Resource Education. Prereq: permission. 1–4 cr.

#706. Terrestrial Arthropods
Biology, ecology, and systematics of the principal terrestrial arthropods, with emphasis on forest and grassland communities. Role of arthropods in decomposition and nutrient cycling; effects of forestry and agricultural practices on fauna. Collection, extraction, identification, and experimental procedures. Two lectures, one lab, fieldwork, and discussions. Prereq: permission. (Also offered as ENTO 706.) 4 cr. (Not offered every year.)

722. Advanced Silviculture
Intensive silviculture of forest stands. Regeneration (e.g., alternative regeneration methods and site preparation); stand management (e.g., thinning schedules and fertilization). Prereq: FOR 629 or equivalent; permission. Special fee. 3 cr. (Not offered every year.)

734. Forest Protection Seminar
Discussion and special problems based on principles and techniques of forest protection. Prereq: permission. 3 cr. (Not offered every year.)

745. Forest Management
Forest land ownership; management objectives; forest inventory regulation and policy; forest administration; professional responsibilities and opportunities. Prereq: completion of junior year in forestry curriculum. Special fee. Lab. 4 cr.

754. Wood Products Manufacture and Marketing
Wood products from harvesting and procurement of raw material to finished product processes, management decisions, marketing, and promotion problems. Case study approach backed up by weekly all-day field trips to wood products manufacturing plants in the region. Prereq: FOR 426 or permission. Special fee. Lab. 4 cr

755. Regional Silviculture and Forest Management
Extended field trip to another forest region. Prereq: senior standing; FOR 745;/or permission. Limited enrollment. 2 cr. Cr/F.

#764. Forest Industry Economics
Business methods and economics in the forest industry; planning for minimum cost operations and profitable use of capital in a forest enterprise. Individual projects Prereq: senior standing; permission. 4 cr. (Not offered every year).

799. Honors Senior Thesis
Students design and conduct individual research projects under the direction of an honors thesis committee. The research should address a real issue in forestry related to students' interests. The resulting written thesis is defended in an oral presentation to committee members. Restricted to seniors seeking honors in major. Prereq: permission 4 cr.

French (FREN)

Department of French and Italian
(For program description, see page 28; see also course listings under Italian.)

Chairperson: Claire-Lise Malarte-Feldman
Professor: Barbara T. Cooper
Associate Professors: Rose T. Antosiewicz, Claire-Lise Malarte-Feldman, Grover E. Marshall, Jack A. Yeager
Assistant Professors: Juliette M. Rogers, Ann H. Willeford
Faculty-in-Residence, Assistant Professors: Claire-Antoinette M. Lindenlaub, Nancy Darby Tench
Faculty-in-Residence, Instructor: Pierre-Emmanuel G. Coudert
Lecturers: Henry M. Smith, Katharine E. Stansfield

New students will be initially assigned to the proper course on the basis of their scores on the College Board Achievement Test or numbers of years of previous study. All courses are conducted in French unless otherwise noted. FREN 631 is the first course counting toward a major. Students educated in French-speaking countries may not register for courses below the 700 level without permission. No UNH or transfer credit will be given for elementary-level college courses in French if the student has had two or more years of French in secondary school.

401-402. Elementary French
For students without previous training in French. Aural comprehension, speaking, writing, reading. Labs. (No credit for students who have had two or more years of French in secondary school; however, any such students whose studies of French have been interrupted for seven years or more should consult the department chairperson about possibly receiving credit.) 4 cr.

425. Introduction to French Language and Culture
Designed for students interested in exploring the language and culture of France and other French-speaking countries. Language learning through various practical communicative activities. Culture learning by means of guest speakers and visuals. Prepares for FREN 401-402. Does not satisfy foreign-language proficiency requirement. 4 cr. (Offered summers only. Not offered every summer.)

501. Review of French
Emphasis on active use of spoken French. Review of basic grammar. Labs and films. Designed primarily for those whose study of French has been interrupted and for those who have had only two years of high school French. Special fee. 4 cr.

503, 504. Intermediate French
Review of grammar with emphasis on the development of reading, writing, speaking, and listening skills, and on culture. Discussion in French of literary and cultural readings. Labs and films. Special fee. 4 cr.

525. Introduction to French Civilization
French civilization from a variety of perspectives and topics. Includes historical, geographical, and artistic expressions of French culture. Readings, discussion, and papers in English. Not for major credit. May be repeated for credit barring duplication of materials. Special fee. 4 cr. (Not offered every year.)

#526. Introduction to Francophone Civilization
Civilization of French-speaking countries other than France. Includes historical, geographical, and artistic expressions of these cultures. Readings, discussion, and papers in English. Not for major credit. May be repeated for credit barring duplication of materials. Special fee. 4 cr. (Not offered every year.)

585. Intermediate Language Study in France
Equiv. to FREN 503, requires four weeks of intensive study of French language and culture at the Centre International d'Etudes des Langues (CIEL) in Brest, France. Prereq: FREN 501 or French 4 in a U.S. high school, with a grade of C+ or better and permission. Special UNH administrative fee and DCE registration fee. Student responsible for personal and travel expenses, and tuition costs in France. 4 cr. (Offered summers only.)

586. Intermediate Language Study in France
Equiv. to FREN 504, requires four weeks of intensive study of French language and culture at the Centre International d'Etudes des Langues (CIEL) in Brest, France. Prereq: FREN 503 or 585 with a grade of C+ or better and permission. Special UNH administrative fee and DCE registration fee. Student responsible for personal and travel expenses, and tuition costs in France. 4 cr. (Offered summers only.)

#621. French Prose in Translation
Works affecting French thought from the Renaissance to the modern period. Readings, discussion, papers in English. Not for major credit. 4 cr. (Not offered every year.)

#622. French Drama in Translation
Major works of comedy, tragedy, and drama. Molière and Racine to the present day. Readings, discussions, papers in English. Not for major credit. 4 cr. (Not offered every year.)

631-632. Advanced French Conversation and Composition
Rapid review of basic grammatical structures and in-depth study of more complex linguistic patterns. Vocabulary building. Frequent written compositions and oral presentations using materials on contemporary culture taken from the various media. Students develop phonetics and oral/aural skills in lab and class. Prereq: C or better in FREN 504. Required for majors. Special fee. 4 cr

635. Topics in French Civilization
Topics drawn from all aspects and periods of French civilization. Pre- or coreq: FREN 631-632. May be repeated for credit barring duplication of materials. Special fee. 4 cr. (Not offered every year.)

636. Topics in Francophone Civilization
Topics drawn from all aspects and periods of Francophone civilizations. Pre- or coreq: FREN 631-632. May be repeated for credit barring duplication of materials. Special fee. 4 cr. (Not offered every year.)

645. The European Community
Topics drawn from all aspects of contemporary French culture in its relationship with the twelve member states of the European Community, with emphasis on the role of France in the building of the European Community. (Also offered as HIST 600, POLT 660, ECON 698.) 4 cr. (Not offered every year.)

651, 652. Readings in French Literature
Reading and rigorous oral and written analysis of texts selected to illustrate important themes/genres in French literature. May be taken in any order. Pre- or coreq: FREN 631-632. Required for majors. 4 cr.

685-686. Junior Year at the University of Burgundy
Studies at the University of Burgundy (in Dijon, France) for juniors who have completed their sophomore year at UNH and have passed with a grade of B or better FREN 631-632, FREN 651, and FREN 652. Students are expected to take French courses in each semester of their freshman and sophomore years. Attendance required at orientation sessions during the second semester of sophomore year. Interested students should consult the director of the program. Prereq: permission. (Not for graduate credit.) 32 cr. Cr/F.

#758. French Literature of the Middle Ages and Renaissance
Prereq: FREN 651 and 652 or equivalent. 4 cr. (Not offered every year.)

762. 17th-Century French Literature
Prereq: FREN 651 and 652 or equivalent. 4 cr. (Offered fall sem. in alternate years.)

#765. 18th-Century French Literature
Prereq: FREN 651 and 652 or equivalent. 4 cr. (Offered spring sem. in alternate years.)

775. 19th-Century French Literature
Prereq: FREN 651 and 652 or equivalent. 4 cr. (Offered fall sem. in alternate years.)

782. 20th-Century French Literature
Prereq: FREN 651 and 652 or equivalent. 4 cr. (Offered spring sem. in alternate years.)

785. Topics in Francophone Literature
Readings in French literatures from outside of France (e.g., Quebec, Africa, the Caribbean). Taught in French. Prereq: FREN 651 and 652. 4 cr. (Not offered every year.)

790. Advanced Language and Style
Translation of literary texts, intensive study of principal techniques of style, explication de textes. Required for major. Prereq: at least two literature courses in French numbered above 652. Special fee. 4 cr. (Fall semester only.)

791. Methods of Foreign Language Teaching
Objectives, methods, and techniques in teaching foreign languages from elementary grades through college. Discussion, demonstration, preparation of instructional materials, microteaching of the language skills. Prereq: permission. Not for major credit. 4 cr. (Fall semester only.)

795, 796. Special Studies in French Language and Literature
Individual guided study of the work of a major author, a genre, or specific topics in literature. Training in bibliography and organization of material. Prereq: permission. 1–4 cr. (Not offered every year.)

#798. Seminar in French Literature
Topics chosen by the instructor. May be repeated for credit barring duplication of material. Prereq: FREN 651, 652; permission. 4 cr. (Not offered every year.)

799. Honors Senior Thesis
Yearlong course leading to an honors senior thesis. Open only to seniors seeking honors in major whose individually designed research projects have been approved by the dept. honors committee and who have been assigned an adviser. Students must enroll for both fall and spring semesters. Students defend the resulting written thesis in an oral presentation before dept. members and others. Prereq: permission. 2 cr./sem.

Genetics (GEN)

(For program description, see page 40.)

Chairperson: Anita S. Klein
Professors: Thomas P. Fairchild, Donald M. Green, Yun-Tzu Kiang, J. Brent Loy, Subhash C. Minocha, Owen M. Rogers, Willard E. Urban, Jr., Robert M. Zsigray
Associate Professors: Thomas M. Davis, Clyde L. Denis, Robert T. Eckert, Anita S. Klein, Thomas D. Kocher, Robert L. Taylor, Jr.
Adjunct Associate Professors: Ann C. Bucklin, William A. Gilbert
Assistant Professor: John J. Collins

704. Microbial Genetics
Expression and transfer of genetic elements (chromosomal and nonchromosomal) in prokaryotic and eukaryotic microorganisms; consideration of factors influencing public health, industry, the environment, and society. Prereq: MICR 503; BCHM 658. Special fee. Lab. (Also offered as MICR 704.)

#705. Population Genetics
Population growth and regulation; genetic variation; factors affecting gene frequency; ecological genetics. Prereq: principles of genetics or permission. (Also offered as PBIO 705.) 4 cr. (Not offered every year.)

715. Molecular Evolution
Molecular mechanisms of organismal evolution. Emphasis on integrating evidence from biochemistry, molecular genetics, and organismal studies. Review of population genetics and the neutral theory. Evolution of sex. Genetics of speciation. Methods of reconstructing phylogeny from molecular sequences. Prereq: BIOL 604 or permission. Some knowledge of statistics plus a computer language (BASIC or PASCAL) is recommended. (Also offered as ZOOL 715.) 4 cr. (Not offered every year.)

722. Immunogenetics
Cellular interactions leading to immune regulatory mechanisms. Emphasis is placed on the major histocompatibility complex, immune responses, and antibody diversity. (Also offered as ANSC 722.) Lab. 4 cr. (Offered alternate years.)

740. Evolutionary Biology
Origin of life; source of genetic variation; population structure, mechanisms of evolution; molecular evolution; ecological adaptation in animals, plants, and man; community structure and evolution. 4 cr. (Not offered every year.)

753. Cytogenetics
Chromosome structure, function, and evolution. Eukaryotic genome organization. Theory of, and laboratory techniques for, cytogenetic analysis in plants and animals. Prereq: BIOL 604. Special fee. Lab. (Also offered as PBIO 753.) 4 cr. (Not offered every year.)

771. Molecular Genetics
Structure, organization, replication, dynamics, and expression of genetic information in eukaryotes. Focus on molecular genetic *mechanisms* of gene expression and its control; molecular genetics *methods*; molecular genetic control of cell division and differentiation during development. Prereq: BCHM 658 or 751; BIOL 604;/or permission. (Also offered as BCHM 771.) 3 cr.

772. Introductory Laboratory in Molecular Genetic Techniques
Biochemical gene manipulation techniques including the genetic, physical, and enzymatic characterization of gene vectors, gene cloning, construction of genetic probes, and sequencing of nucleic acids. Prereq: BCHM 752; and either BCHM 771 or MICR 704. (Also offered as BCHM 772.) Special fee. 3 cr.

774. Plant Cell Culture and Genetic Engineering
Theory and techniques of cell/tissue culture and genetic manipulation in plants, transformation vectors, somatic cell genetics, regulation of foreign gene expression, molecular basis of agriculturally important traits, environmental and social implications of genetic engineering in plants. Prereq: BIOL 604 or permission. Complements BCHM 765. Coreq: GEN 775. (Also offered as PBIO 774.) 3 cr.

775. Plant Cell Culture and Genetic Engineering Lab
Techniques of plant cell and tissue culture, protoplast fusion, and genetic transformation. Mutant cell selection, analysis of foreign gene expression. Coreq: GEN 774. (Also offered as PBIO 775.) Special fee. 2 cr.

782. Developmental Genetics
The molecular genetic basis of metazoan development. Focuses on how genes direct the pro-

cess and how this problem is analyzed in model organisms using molecular genetic approaches. Topics include: control of cell division, maternal factors, cell-cell interactions, and differential gene expression. Prereq: BIOL 604; BCHM 658 or 751. (Also offered as BCHM 782.) 3 cr.

Geography (GEOG)

(For program description, see page 29.)

Chairperson: Robert G. LeBlanc
Professors: Robert G. LeBlanc, William H. Wallace
Associate Professors: Robert L. A. Adams, Alasdair D. Drysdale
Adjunct Associate Professor: James W. Cerny
Assistant Professor: Debra L. Straussfogel

401. Regional Geography of the Western World
Major culture areas of the Western world and the unique interaction of human and physical phenomena that produces the distinctive character of these areas. Emphasis on the manner in which people of different cultures have made use of the opportunities and solved the problems existing in the major regions occupied by Western culture: Europe, Russia, the Americas, and Australia and New Zealand. 4 cr.

402. Regional Geography of the Non-Western World
Major culture areas of the non-Western world and the unique interaction of human and physical phenomena that produces the distinctive character of these areas. Emphasis on the manner in which people of different cultures have made use of opportunities and solved problems existing in the major regions occupied by non-Western cultures: the Middle East and North Africa, Africa south of the Sahara, Oriental Asia and the Pacific Islands. 4 cr.

473. The Weather
Introductory treatment of weather phenomena and the physical processes underlying those phenomena. Emphasis on the nature and variability of New England weather. 4 cr.

#512. Geography of Canada
Historical and regional geography of Canada. Historical growth; development of its distinctive regions; contemporary prospects and problems. Resource base, exploration, settlement, population growth, cultural contrasts, economic development, and special relationship with the U.S. Required 5-day field trip to Canada. Prereq: permission. 4 cr. Special fee. (Not offered every year.)

513. Geography of the United States
Geographical diversity of the U.S.: its physical setting, historical development, and contemporary spatial organization Distinctive character and problems of major American regions; recent changes in economic, demographic, and social conditions. 4 cr. (Not offered every year.)

#531. Geography of Western Europe and the Mediterranean
Regional and topical analysis of Western Europe and the Mediterranean. The geographical diversity of Europe in the context of physical setting and historical development. Present-day problems. 4 cr. (Not offered every year.)

540. Geography of the Middle East
Environmental, cultural, political-geographic, and ecological foundations of the Middle East. Selected regional problems and issues, e.g., geographical dimensions of the Arab-Israeli conflict, oil, urbanization, population growth, and nomadism. 4 cr. (Not offered every year.)

570. Introductory Climatology
Characteristics and world distribution of present climates. Climates of the past and theories of climatic change. 4 cr.

#572. Physical Geography
Factors in the formation and distribution of landforms, soils, and vegetation. Human significance of natural systems. Lab. Special fee. 4 cr. (Not offered every year.)

581. Human Geography
Differentiation of the world in terms of population, race, language, religion, political territory, and economic life. Collection and critical use of empirical data; emphasis on spatial and ecological analysis. 4 cr.

582. Economic Geography
Investigation of the manner in which resources and space have been organized for the production of goods and services: agriculture, the extractive industries, manufacturing, and the tertiary sector. Empirical studies, theories of location, and location models. Major contemporary problems and issues in agriculture and food supply, energy sources, industrial readjustment, and the global economy. 4 cr. (Not offered every year.)

583. Urban Geography
Spatial structure of cities and the city system. Emphasis on the North American city and its problems: land use, transportation, political fragmentation, physical environment, and residential patterns. Trends in urbanization in the developed and developing worlds. Global cities. 4 cr. (Not offered every year.)

584. Political Geography
Interactions between geographic and political phenomena at the sub-national, national, and international levels. Emphasis on geographical aspects of current political problems within and between states. 4 cr. (Not offered every year.)

585. Geography of Population and Development
A regional approach to the study of population geography with concern for the interaction between the focus of economic growth and the components of population change and development. Considers the environmental impact of development trends in the developed and developing worlds and the relationship of these trends to sustainable growth and population patterns. 4 cr.

590. Introductory Cartography
Map usage, design, and production; emphasis on special-purpose thematic maps as used in scholarly papers, theses, journals, and books. Macintosh computer used as desktop mapping tool. 4 cr.

#610. Geography of New England
The distinctive physical setting of New England, its settlement and development during the past three centuries, and the present-day problems and opportunities of the region. Three required weekend field excursions near end of term. Prereq: permission. Special fee. 4 cr. (Not offered every year.)

#690. Advanced Cartography
Organized in seminar fashion to study a selected major cartographic topic in detail. Emphasis on use of computers as cartographic tools. Potential topics include contour mapping, atlas design, and map perception. Prereq: GEOG 590 or permission. 4 cr. (Not offered every year.)

795. Special Project in Geography
Readings, library, archival, and fieldwork. Primarily for geography seniors. Prereq: permission. 2 or 4 cr.

797. Seminar in Geography
Exploration of geography as a research discipline. Techniques of geographic analysis. Definition and investigation of research problems. Primarily for geography seniors. 4 cr. Cr/F.

Geology

(See Earth Sciences.)

German (GERM)

Department of German and Russian
(For program description, see page 29; see also course listings under Japanese and Russian.)

Chairperson: James L. Sherman
Associate Professors: Roger S. Brown, Edward T. Larkin, Nancy Lukens, Mary E. Rhiel, James L. Sherman

New students will be initially assigned to the proper course based on their scores on the College Board Achievement Test or number of years of previous study. New students are encouraged to present scores on the German Advanced Placement (AP) Test for UNH course credit and for placement at an advanced level. No transfer or UNH credit can be given for elementary German (401-402) if the student has had two or more years of that language in secondary school unless a significant amount of time has elapsed since completion of the last

course. Students may petition the German program to be admitted to the 400-level courses for credit. Students considering a major or minor in German should consult with the program as early as possible to plan a meaningful sequence of study and to discuss options for studying abroad. All courses are conducted in German unless otherwise indicated.

401-402. Elementary German
For students without previous training in German. Aural comprehension, speaking, writing, reading, language labs. No credit for those with two or more years of German in secondary school (for exceptions, see above). 4 cr.

#403-404. German for Reading Knowledge
Reading in the natural, physical, and social sciences and the humanities for students without previous training in German. No credit for those with two or more years of German in secondary school. 4 cr.

501. Review of German
Refresher course for those whose study of German has been interrupted or who have had no more than two years of high school German. Emphasis on oral-aural practice; review of basic structures; reading and writing to develop active command of the language. Labs. 4 cr.

503-504. Intermediate German
Review of grammar; practice in oral and written expression; readings and cultural material. Prereq: GERM 401-402 or equivalent. Labs. 4 cr.

#520. Women in German Literature and Society (in translation)
A study of representative works by and about women in German society from the 18th century to the present. Texts discussed include fiction, fairy tales, autobiography, interviews, poetry, diaries, historical essays, and film, as well as selected critical works on the history of German feminism and feminist aesthetics. 4 cr.

521. Major German Authors in English
Selected masterpieces of the 19th and 20th centuries by authors such as Goethe, Heine, Mann, Kafka, Hesse, Bachmann, Brecht, Frisch, and Dürrenmatt. Readings and discussions in English. Cannot be used toward the German major, but recommended as an elective for both majors and nonmajors. 4 cr.

#523. Women and German Film
Acquaints students with major German film texts. Asks gender-specific questions about German film history, male and female filmmakers, the construction of sexuality through film images and narrative, and the impact of feminism on these. In English. Can be used to fulfill gen ed Group 5: foreign cultures. 4 cr.

525. Introduction to German Culture and Civilization
Aspects of the political, social, and cultural life of Germany, Austria, and Switzerland. Conducted in English. Required of German majors; strongly recommended for any students planning study abroad in a German-speaking country. 4 cr.

601. Introduction to German Literature
Reading and analysis of poems, dramas, and short prose; introduction to theory of literary forms and methods of analysis. Required of all German majors; prerequisite to upper-level literature courses. Prereq: knowledge of German. 4 cr.

625. Berlin Seminar I (Study Abroad)
Explores the recent history, culture, and politics of the once divided city of Berlin. Addresses German unification and the everyday effects of the end of the Cold War, including the questions of resistance, multiculturalism, and the recent resurgence of racist violence. Includes intensive language instruction, lecture, readings, discussion, and a final project. Prereq: GERM 504 or equivalent; permission. Special fee. 4 cr.

626. Berlin Seminar II (Study Abroad)
A continuation of GERM 625. Extends the homestay in Berlin and adds a supervised independent study project on some aspect of the material covered in 625, to be defined by contract with the instructor. Prereq: GERM 504 or equivalent; GERM 625; permission. Special fee. 1-4 cr.

630. German Narrative Forms
Textual studies based on works from one of the following prose genres: novel; novella; autobiography; fairy tale; short prose (short story, parable, documentary prose, feuilleton). Focus on the nature and characteristics of the genre, thematic and stylistic features of each text, and the diverse cultural, political, gender, or national perspectives that generate these forms. 4 cr.

631. Advanced Communication Skills I
Intensive practice in vocabulary building and developing a sense of appropriate style for various contexts of oral and written communication. Special emphasis on conversational and expository speaking. Discussion of topics of current interest, oral reports, role play, and simulation of everyday situations, reinforced by written work. Required for the German major and minor. 4 cr.

632. Advanced Communication Skills II
Intensive practice in vocabulary building and coherent expression in a variety of stylistic contexts. Special emphasis on writing skills, from expository prose to letter and résumé writing, essays, journalistic reports, and creative writing, focusing on topics of current interest. Required for the German major. 4 cr.

640. German Drama
Selected masterpieces of the German theatre from the 18th century to the present, including reception and performance history. Course may vary in emphasis from classical German tragedy and comedy to more modern forms such as didactic and documentary plays, tragicomedy, and farce. 4 cr.

645. Contemporary German Literature
Literary trends in the German-speaking countries since 1945. Analysis and interpretation of works by major authors. 4 cr.

#685, 686. Study Abroad
A summer, semester, or year of study in one or a combination of the departmentally recognized programs at the Institute of European Studies in Freiburg, Germany, or Vienna, Austria, or with the University of Cincinnati in Hamburg, Germany, or other appropriate programs. Open to students of any major with GERM 504 or equivalent training. Financial aid applies to all approved programs. Interested students should inquire at department for program brochures and specific requirements and should apply in consultation with a German adviser. For information on other study abroad programs, students should contact the Center for International Perspectives. Variable to 16 cr. Cr/F. An IA grade will be assigned until official transcript is received from the foreign institution.

#720. Images of Women in German Literature
Reading and analysis of original texts by both male and female authors from the Middle Ages to the present with a view toward the changing representation and self-concept of women. Critical approaches to the literary canon. Prereq: GERM 504; 601;/or equivalent experience. 4 cr.

721. German Culture and Civilization
Historical, social, artistic, and folkloristic developments in German-speaking countries from the beginning to the present. Prereq: GERM 525 or permission of instructor. 4 cr.

#723. Survey of Preclassical German Literature
Lecture and readings in German literature from its Germanic beginnings to the Enlightenment. Prereq: GERM 601. 4 cr.

724. The Age of Goethe
Major literary movements between 1770 and 1832. Reading and analysis of selected works. Prereq: GERM 601. 4 cr.

727. German Literature of the 19th Century
Major literary movements from Goethe's death to the unification of Germany by Bismarck (1832–1872). Reading and analysis of selected works. Prereq: GERM 601. 4 cr.

728. Modern German Literature
Major literary movements from 1872 to 1945. Reading and analysis of selected works. Prereq: GERM 601. 4 cr.

733. History and Structure of the German Language
An analysis of the history and structure of the German language from Indo-European to New High German with an emphasis on phonology and morphology. Prereq: GERM 632 or equivalent. 4 cr.

791. Methods of Foreign Language Teaching
Objectives, methods, and techniques in teaching foreign languages from elementary grades through college. Discussion, demonstration, preparation of instructional materials, microteaching of the language skills, including developments in computer-assisted instruction. Prereq: permission of instructor. 4 cr.

795, 796. Independent Study
Open to highly qualified juniors and seniors. To be elected only with permission of the department chairperson and of the supervising faculty member or members. Barring duplication of subject, may be repeated for credit. 1–4 cr.

#797, 798. Special Studies in German Language and Literature
Selected topics in language, culture, and literature. 2 or 4 cr.

Gerontology (GERO)

(For program description, see page 82.)

Adviser: Elizabeth L. Crepeau

600. Introduction to Gerontology
Introduction to the study of normal aging and to the applied practice of service to the elderly. Primarily for minors but open to other students. 4 cr.

795. Independent Study
Practical experience with elderly populations under supervision of designated faculty. 4 cr.

(See Nursing 670 for Issues in Health Care of the Aged.)

Greek (GREK)

Department of Spanish and Classics
(For program description, see page 30; see also course listings under Latin and Classics, for faculty listing, see page 184.)

New students will be initially assigned to the proper course on the basis of their scores on the College Board Achievement Test or number of years of previous study. Transfer credit will not be given for elementary-level college courses in foreign languages if a student has had two or more years of the foreign language in secondary school.

401-402. Elementary Classical Greek
Grammar, simple composition, and translation. For students without previous training in Greek. 4 cr.

403-404. Elementary Modern Greek
Aural-oral practice and the study of fundamental speech patterns, reading, and writing to achieve a firm basis for an active command of the language. (No credit for students who have had two or more years of modern Greek in secondary school.) Lab. 4 cr.

503-504. Intermediate Classical Greek
Readings from Xenophon, Plato, Herodotus, Euripides, and the New Testament. Prereq: GREK 402. 4 cr.

#505-506. Intermediate Modern Greek
Short selections from modern Greek literature with grammar review and oral practice. Readings from such authors as Solomos, Cavafy, Palamas, Kazantzakis, Venezis, Myrivilis, Seferis, and Elytis. Prereq: GREK 404 or equivalent. Lab. 4 cr.

#631-632. Greek Prose Composition
Review of Attic Greek grammar; study of Greek prose style; English to Greek translation. Prereq: permission. 4 cr.

751, #752. Homer and the Archaic Period
Readings from the *Iliad*, the *Odyssey*, the Homeric hymns, Hesiod, Pindar, and the lyric poets. Prereq: permission. 4 cr.

753, 754. Advanced Studies in Athenian Literature
A) Aeschylus; B) Sophocles; C) Euripides; D) Aristophanes; E) Herodotus; F) Thucydides; G) Xenophon; H) Plato; I) Aristotle; J) Lysias; K) Demosthenes; L) Isocrates. Major Attic authors from the Battle of Marathon to the death of Alexander the Great. Prereq: permission. 4 cr.

#791. Methods of Foreign Language Teaching
Objectives, methods, and techniques in teaching foreign languages from elementary grades through college. Discussion, demonstration, preparation of instructional materials, microteaching of the language skills. Prereq: permission. 4 cr.

795, 796. Special Studies in Greek
A) Pre-Socratic Philosophers; B) Hellenistic Greek Authors; C) Menander; D) Callimachus; E) Apollonius of Rhodes, F) Theocritus; G) Polybius; H) Greek Authors of the Roman Empire; I) Plutarch; J) Septuagint, K) New Testament; L) Greek Church Fathers; M) Byzantine Authors, N) Spoken Greek; O) Advanced Greek Composition; P) Introduction to Classical Scholarship; Q) Greek Epigraphy; R) Greek Dialects; S) Comparative Grammar of Greek and Latin; T) Homer: A Linguistic Analysis; U) Greek Institutions; V) Paleography and Textual Criticism. Topics selected by instructor and student in conference. Prereq: permission. 4 cr.

Health and Human Services

(See School of Health and Human Services.)

Health Management and Policy (HMP)

(For program description, see page 69.)

Chairperson: David A. Pearson
Director of Undergraduate Studies: Marc D. Hiller
Professors: David A. Pearson, Roger A. Ritvo, John W. Seavey, Lee F. Seidel
Associate Professors: Robin Gorsky, Marc D. Hiller, Richard J. A. Lewis, Jeffrey Colman Salloway
Assistant Professors: Susan L. Frankel, James B. Lewis, Jeffrey G. White
Research Assistant Professors: Mary M. Ganger, Seth Welles

401. U.S. Health Care Systems
Nature and functions of health care services and health professionals; impact of social, political, economic, ethical, professional, legal, and technological forces on health care systems. Current health policy issues. 4 cr.

501. Epidemiology and Community Medicine
The distribution and determinants of disease, illness, and health in the community. Community health and illness measures, health status, and sources of data. Development of hypotheses and study designs to reduce community health problems using epidemiological reasoning, methods, and analyses. Special fee. Lab. 4 cr.

510. Hospitals in the 20th Century
Examines the development of hospitals in the United States since 1900. Emphasizes the social power of the hospital as a changing social institution in American society. 4 cr.

555. Nursing Facility Management
Describes and analyzes the role, organization, function, and characteristics of nursing homes. Examines their administration, staffing, financing, planning/marketing, and regulation. Includes residents' psychological, biological, and sociological needs. Addresses several core information areas for nursing home administrators. Prereq: permission. Majors not permitted. 4 cr.

600. Special Topics
A) Hospital Management, B) Long-term Care Management; C) Ambulatory Care Management; D) Clinical Services Management; E) Home Care Management; F) Mental Health Management; G–Z) Interdisciplinary. Prereq: junior major or permission. May repeat, but may not duplicate subject areas. 1–4 cr.

621. Prepracticum Seminar
Preparation for field practicum experience, orientation to experiential learning and competency development. Prereq: major. 2 cr.

622. Field Practicum
Experiential learning in a health organization, application of theories to practice. Planned learning objectives are accomplished through three distinct components. Supervision by agency personnel. Prereq: junior major; permission.
622A, Field Practicum Organizational Analysis: analysis of assigned health care agency, from external and internal viewpoints. Coreq: 622B, 622C. 1 cr.
622B, Field Practicum Management Skills Development: development of the basic quantitative and interpersonal skills required of a health services manager. Coreq: 622A, 622C. 1 cr.
622C, Field Practicum Project Analysis: demon-

stration of knowledge and analysis of specific problem-solving skills required during internship. Coreq: 622A; 622B. 1 cr.

710. Financial Management for Clinicians
Basics of health care financial management and cost accounting. Includes cost concepts and product costing, budgeting, and variance analysis with emphasis at the departmental level. Contains basic accounting principles; use of ratio analysis to examine balance sheets and revenue and expense statements. Explores capital project analysis and health care reimbursement. Prereq: HMP 401 or equivalent; permission. Majors not permitted. 4 cr.

721. Managing Health Care Organizations
Organizational characteristics of ambulatory, acute, and long-term care facilities. Management issues and strategies involving governance, clinical services, human and fiscal resources, and community-based services. Prereq: major or permission. 4 cr.

723. Health Planning
Theoretical and historical foundations of health planning; the relationship of health planning and regulation; the application of planning methods; and the utilization of strategic planning and its relationships to marketing. Prereq: major or permission. Special fee. 4 cr.

734. Health Law
Concepts and principles of law as these affect medical and administrative decision making in health care institutions and the ability to discern issues that warrant the advice and/or assistance of legal counsel. Topics covered include corporations and antitrust, property law, patients' rights under law, and malpractice. Prereq: major or permission. 4 cr.

740. Management Accounting for Health Care Organizations
Cost accounting, cost analysis, and budgeting in planning and controlling health care operations. Techniques of variance analysis, cost allocation, ratio analysis and management of working capital, concepts of capital investment decision analysis, rate setting, and reimbursement. Prereq: major or permission. Special fee. 4 cr.

741. Quantitative Methods for Health Care Organizations
Methods to increase efficiency of health care organizations, including decision analysis, cost-benefit analysis, linear programming, queuing, regression, as well as descriptive analysis and projection methodologies. Prereq: major or permission. 4 cr.

742. Strategic Management for Health Care Organizations
Application of managerial methods involving financial, marketing, and operational analysis to health management. Case studies. Prereq: major or permission; HMP 740. 4 cr.

743. Health Care Reimbursement
Explores concepts and techniques associated with paying providers of health care. Impact of current practices and future trends on health care providers and U.S. health care system. Prereq: major or permission. 2 cr.

744. Ethical Issues in Health Management and Medicine
Ethical theories and decision-making models; patients' rights and professional responsibilities; social justice and resource allocation; critical issues facing clinicians, managers, and health policy makers; managerial versus medical care conflicts. Prereq: major or permission. 4 cr.

746. Health Policy
Analysis of the public policy process, the development of health policies in the United States, and discussion of specific health policy issues. Prereq: major or permission. 4 cr.

#750. Comparative Health Care Systems
Analysis and comparison of world health problems and delivery systems using nations with different cultures, political and economic systems, and stages of economic development. Methods for developing and evaluating health care systems. 4 cr.

755. Aging and Long-Term Care Policy
Analyzes significant contemporary public policy issues associated with the aging population and the continuum of long-term care in the United States. Emphasis on costs associated with and approaches to financing, accessibility, delivery, and quality of home-based, community-based, and institution-based health care services. Prereq: major or permission. 4 cr.

796. Independent Study
In-depth study with faculty supervision. Prereq: permission of major adviser and faculty in the area concerned. 2–4 cr.

798H. Honor Project/Research Design
Examines selected research designs and methods used in health services research/program evaluation. Establishes theoretical and methodological foundation for honors-in-major research project to be conducted during the subsequent semester under a faculty member's supervision. Prereq: senior honors-in-major status and permission. 2 cr.

#799H. Honors Project/Research
In-depth research project (conducting and analysis) under supervision of faculty member. Includes scholarly presentation of findings to faculty and other interested parties and preparation of manuscript suitable for publication in peer-reviewed journal. Prereq: HMP 798H and permission. 4 cr.

History (HIST)

(For program description, see page 30.)

Chairperson: Jeffry M. Diefendorf
Professors: Charles E. Clark, Jeffry M. Diefendorf, William R. Jones, Francis D. McCann, Jr., Robert M. Mennel, Harvard Sitkoff, Laurel Ulrich, John O. Voll, Douglas L. Wheeler
Adjunct Professor: Dennis A. O'Toole
Associate Professors: J. William Harris, Jr., Allen B. Linden, Gregory McMahon, Janet L. Polasky, Marc L. Schwarz
Adjunct Associate Professor: William R. Woodward
Assistant Professors: W. Jeffrey Bolster, Cathy A. Frierson, Kristin E. Gager, Jan V. Golinski, Eliga H. Gould, Lucy E. Salyer
Faculty-in-Residence, Assistant Professor: Paul S. Landau
Faculty-in-Residence, Instructor: Andrea S. Friedman
Lecturers: James P. Cullen, Barbara M. Ward

Group I. American History

405. History of Early America
America from the early age of European discovery to the mid-19th century. Emphasis on the interaction of European, native American, and African peoples on the separation of the English colonies from Great Britain, and on the establishment and early history of the United States. Not open to majors or minors who elected HIST 410. 4 cr.

406. History of the Modern United States
History of the United States since the mid-19th century. Political, social, and economic developments as well as relationships of the modern U.S. with other countries. Not open to majors or minors who elected HIST 410. 4 cr.

410. Historical Survey of American Civilization
Topical survey, within broad chronological divisions, of the development of American civilization since 1600. Not open to majors or minors who elected HIST 405 or 406. 4 cr.

#505, 506. African-American History
Experiences, aspirations, and contributions of Black Americans from their ethnic origins in Africa to the present American crisis in race relations; comparative study of cultures and institutions. 4 cr.

507. Native Peoples of the Americas
Indian societies of the American continents, their reactions to and interactions with the Europeans who invaded and conquered them. Emphasis on North America. 4 cr.

509. Law in American Life
Investigates the role of law in American social, political, and economic life from the European settlements to the present. Traces the development of legal institutions but focuses on the various functions of law (e.g., in structuring social relationships, allocating resources, defining governmental authority, expressing social and moral values, and as a mechanism for control). 4 cr.

511. History of New Hampshire
From presettlement times to the present, emphasizing the use of locally available materials and sources. 4 cr.

520. The Vietnam War
Intensive full-scale examination of how and why the United States went to war in Vietnam, how and why it failed and the consequences and legacies of American involvement. 4 cr.

566. Women in American History
Key changes in women's roles in the past three centuries with an emphasis upon the peculiarities of the American setting. How, for example, were women's lives affected by the frontier; the intersection of European, African, and native American cultures; religious diversity; the problem of defining citizenship in a democratic republic? Students will sample recent scholarship in women's history and study a wide variety of documents produced by women. 4 cr.

603. The European Conquest of America
Study of the social consequences of colonization, migration, and war in America, 1500–1775. Emphasis on the interaction of British colonies with competing European cultures (French, Dutch, Portuguese, and Spanish), with native Americans, and with African-American slaves. 4 cr.

605. Revolutionary America, 1750-1788
Examines the social, political, and cultural transformation of thirteen British colonies into the United States, up to the adoption of the Constitution. 4 cr.

606. History of the Early Republic
Explores the histories of the people and institutions that transformed the new United States from a coastal republic of largely independent freeholders to a transcontinental democracy increasingly riven by class. Topics include slavery, the family, reform movements, and the formation of national identity. 4 cr.

#607. The American Character: Religion in American Life and Thought
Interdisciplinary study of the American religious experience and its relationship to other aspects of American culture, taught by a team of three specialists, each in a different discipline: American intellectual and cultural history, American literature, and American church history. Central emphasis on several transforming themes of the 19th century and their effects upon the interplay of religion and society. (Also offered as ENGL 607, HUMA 607, and RS 607.) 4 cr.

#608. Arts and American Society: Women Writers and Artists, 1850–Present
Team-taught course studying the impact of gender definitions on the lives and works of selected American artists. Considers lesser-known figures such as Fannie Fern, Lilly Martin Spencer, and Mary Hallock Foote as well as better-known artists such as Willa Cather and Georgia O'Keeffe. Prereq: permission or one of the following: WS 401, HIST 566, ENGL 585 or 586, ENGL 685 or 785, or a 600-level art history course. (Also offered as ARTS 608, ENGL 608, and HUMA 608.) 4 cr

609. American Legal History: Special Topics
In-depth thematic exploration of law in American life. Topics include race and equality in America, community, pluralism, and American law; property, liberty, and law; gender and law. May be repeated for credit with instructor's permission. Prereq: HIST 509 or instructor's permission. Consult department for listing of topics. 4 cr

#610. American Studies: New England Culture in Changing Times
A team of three instructors from history, literature, and art investigates major contributions New England has made to American life. Focus on three periods: the Puritan era, 1620–90; the Transcendental period, 1830–60; and the period of emerging industrialism in the late 19th century. Prereq: second semester sophomore. (Also offered as ARTS 610, ENGL 610, and HUMA 610.) Not for art studio major credit. 4 cr.

611. Civil War and Reconstruction in the United States
Surveys the period from the presidency of Andrew Jackson to the end of the Reconstruction. Focuses on causes, course, and consequences of the Civil War. Topics include slavery in the Old South, antebellum reform movements, creation and breakdown of the Second Party System, social and economic (as well as military) events during the war and major developments during Reconstruction after the war. 4 cr.

612. Emergence of Industrial America
Investigates the economic transformation of 19th-century America from a rural, agricultural to an urban, industrial society. Explores the sweeping economic changes and focuses on such topics as change in work and leisure, westward expansion and its effects on native Americans, shifts in gender roles, growth of a consumer culture, rise of the labor unions and populism, immigration, reform and regulation movements, growth of American imperialism, and intellectual developments. 4 cr.

615, 616. 20th-Century America
U.S. after 1900; cultural, political, and social factors causing major changes in American life. Semester I: Progressivism through the New Deal. Semester II: World War II to the present. 4 cr.

619, 620. The Foreign Relations of the United States
Primarily the history of American diplomacy, with attention given to the nondiplomatic aspects. Semester I: American Revolution to 1890. Semester II: 1890 to date. 4 cr.

621, 622. History of American Thought
Significant American thinkers considered in their social context. Semester I: 1600 to 1860. Semester II: 1860 to present. 4 cr.

#623. Anglo-American Social History
Study of everyday life in British America and the early United States, 1600–1820, with an emphasis on gender, class, and race. Consideration of childbearing, labor systems, religious observance, crime, and other themes in the light of recent social theory. Readings in both primary and secondary literature, with an emphasis on local records and on material culture. 4 cr.

624. Modern American Social History
Major social developments since 1820: industrialization and the history of labor, immigration, urban growth, race relations, history of women and of the family. 4 cr.

#625. Southern History and Literature since 1850
Equal focus on the history and literature of the South. Topics include slavery, the Civil War, Reconstruction, the age of segregation, and the civil rights movement. Literary focus on the "Southern Renaissance" of the 1930s and after, including works by William Faulkner, Robert Penn Warren, Flannery O'Connor, and Richard Wright. 4 cr.

Group II. European History

435, 436. Western Civilization
The classical origins and evolution of European civilization through the Renaissance, Reformation, and voyages of discovery. The rise of Europe to global supremacy in the 19th century and its transformation in the 20th century. 4 cr.

521. The Origins of Modern Science
Development of scientific ideas in Europe from the Renaissance through the Scientific Revolution to the Enlightenment. Topics include themes in the physical and biological sciences and their relations to cultural and social contexts. No special science background is required. 4 cr.

522. Science in the Modern Period
Development of science, particularly in Europe and North America, from the 18th century to the present. Themes include Darwinism, the growth of modern physical and biological sciences, and science in the contemporary world. No special science background is required. 4 cr.

523. Introduction to the History of Science
Introduces the role of science in Western culture, from the ancient world to the 20th century. Covers important themes of the development of the physical and biological sciences, and indicates their place in broader social and cultural changes. No specific technical background is required. 4 cr.

537. Espionage and History
Introduction to the history and politics of espionage and intelligence organizations in modern times. Special attention to intelligence work among the major powers in World War I, World War II, and the Cold War. Readings include autobiographical accounts and other primary sources as well as novels. 4 cr.

559, 560. History of Great Britain
History of Great Britain from the earliest times to the present; from social, constitutional, economic, political, and intellectual perspectives. Designed for history students as well as those interested in literature, western political and social systems, American studies, education, and prelaw. 4 cr.

563. Introduction to Russian Culture and Civilization
Interdisciplinary course on the development of Russian culture from its origins through the end of the 19th century. Historical documents, literary works, ethnographic materials, films, slides of Russian art, and music. 4 cr.

565. Women in Modern Europe
A social history of women in Europe from 1700 to the present. Examines the development of the "modern nuclear family," transformations in women's work during the industrial revolution, and women's political evolution from bread rioters to hearth tenders to petitioners. Sources include published diaries, historiographical studies, and novels. 4 cr.

639, 640. Three Medieval Civilizations
Demise of classical antiquity in the lands bordering the Mediterranean, and the genesis and fruition of three new cultural traditions: Latin Christian, Islamic, and Byzantine. Religious, literary, and scholarly survivals and innovations from 400 A.D. to 1400 A.D. 4 cr.

641. Age of the Renaissance
The birth of the Renaissance; its economic, social, and political roots; and the flowering of Renaissance culture. Covers period from 1300 A.D. to 1600 A.D., with stress on Italy. 4 cr.

642. The Age of Reformation
The reformation of church, society, and human values that shook Europe in the 16th century, and its roots in the 14th and 15th centuries. 4 cr.

647. Early Modern France
An exploration of the culture and politics of early modern French society. Popular culture, religion, gender relations, the family, state-building, political theory, and revolution will be emphasized. Primary documents in translation will be read and discussion encouraged. 4 cr. Cr/F.

648. Modern France
French society from Napoleon to Mitterand. Topics include the Revolution of 1848 and the Paris Commune; World Wars and the Vichy regime; Existentialism, DeGaulle, and the Revolt of May–June 1968. 4 cr.

649. Comparative Topics in the History of Early Modern Europe
Topics will vary, but may include enlightenment and revolution; the peasantry; gender and the family; crime and deviance; science and society. 4 cr. (May be repeated for a maximum of 8 cr.) Cr/F.

#650. History of European Socialism
Socialist thought in Europe in the 19th and 20th centuries. Examines Utopian Socialism, the development of Marxism, the emergence of the New Left, and new socialist developments in the late 20th century. 4 cr.

651, 652. Topics in European Intellectual History
Exploration of such major developments as the Enlightenment, Russian intellectual history, ancient world views and cosmologies, and the relationship between gender and intellectual history. 651 includes topics up to the Scientific Revolution; 652 includes topics since the Renaissance. Since topics will vary, students should check the department newsletter or office for course theme in any given term. 4 cr. (May be repeated as topics change.)

654. Topics in History of Science
Advanced study of a selected topic in the history of European science since the Renaissance. (Topics vary.) Prereq: HIST 523 or permission. 4 cr.

#656. 20th-Century Europe
World War I, European totalitarianisms, World War II, the loss of European primacy, and the search for a new Europe. 4 cr.

#659. History of Modern Spain and Portugal
Iberian states and their peoples from the coming of liberalism to the present. Failure of Iberian liberalism and liberal government. Political and social change, imperial and intellectual movements, influence of Western European thought and activity. 4 cr.

661, 662. England in the Tudor and Stuart Periods
Political, religious, socioeconomic, and intellectual forces for change at work in England from the accession of Henry VII to the revolution of 1688–89. 4 cr.

#663. Russia: Origins to 1905
Russia from its foundation through the Revolution of 1905. Political, social, and economic developments; intellectual and ideological currents. 4 cr.

664. Russia: Modernization through Soviet Empire
The challenges of modernization, experience and legacy of Leninist and Stalinist revolutions, Soviet consolidation, and decline through the Gorbachev era. 4 cr.

667. Early Modern Germany: Reformation to the Revolution of 1848
Conflict between Holy Roman Empire and petty states; rise of Prussia; religious conflict and Enlightenment. 4 cr.

668. Modern Germany since 1848
Bismarck and Imperial Germany; Weimar and the rise of Hitler; divided Germany post-World War II. 4 cr.

#789. Seminar in the History of Science
In-depth examination of a selected topic in the history of science. Subject varies. Open to undergraduates with permission of the instructor. No special background in science required. 4 cr.

Group III. Non-Western History

421. World History to the 16th Century
The global experience of human communities with special emphasis on the development of the major civilizations and their interactions. Comparisons of social, cultural, religious, and political life and the emergence of distinctive and diverse human societies are examined. 4 cr.

422. World History in the Modern Era
Emergence of major global human interactions due to the growth of major civilizations. The global context for the rise of the modern West. The rise and decline of Western global domination and emergence of new states and changing societies throughout the world. 4 cr.

531, 532. Latin American History
Semester I: Amerindian America and the European conquest and domination to the last half of the 18th century. Semester II: problems of identity, integration, and nationalism, with analysis directed at selected national areas (e.g., Brazil, Mexico, Argentina, and Cuba), plus attempts at generalization. 4 cr.

575. The Ancient Near East
From the neolithic revolution to the time of Alexander the Great. Rise of civilization; nature of human artistic and intellectual development in the earliest civilizations of Mesopotamia and Egypt; Judaism in its historical setting. 4 cr.

579. History of China: From Empire to People's Republic
The origins and development of Chinese civilization and its revolutionary transformation in modern times. Institutional and cultural changes will be stressed. 4 cr.

580. History of Japan: From Yamato to Tokyo
The development of Japanese civilization from its origins to the present. Special attention will be paid to the transformation of Japan from an agrarian to an industrial society. 4 cr.

585. Middle Eastern History in the Medieval Islamic Era
The origins and expansion of Islam and the development of the Muslim community from the time of Muhammad until the Islamic empires of the 16th century. Attention is given to religious and artistic as well as political developments. 4 cr.

586. History of the Middle East in Modern Times
Emergence of modern Middle Eastern states and societies from the time of the Ottoman Empire to the present. A survey of major developments, including the emergence of nationalism, the Islamic resurgence, and social transformations. 4 cr.

587, 588. History of Africa South of the Sahara
From ancient times to the present. Semester I: from prehistoric times to 1870. Semester II: from 1870 to the present. African migrations, kingdoms, and societies; African responses to the slave trade; Islam; European imperialism, colonialism, and industrialization; African nationalism, independence, and postindependence problems. 4 cr.

590. The City in History
The preindustrial and modern city as a philosophical and cultural institution, with emphasis on city design and architecture. Certain great cities, such as Athens, Florence, Paris of 1900, and Berlin of the 1920s, dealt with in detail. 4 cr.

631. Latin American History: Regional or Country Studies
Seminar; readings and discussions of literature relative to region or country being studied. See department listing for the current semester's topics. Students are guided through preparation of a research proposal. HIST 531, 532 recommended. 4 cr.

632. Latin American History: Topical Studies
Thematic seminar; reading and discussions of lit-

erature relative to selected topics. See the department listing for the current semester. Students are guided through preparation of a research proposal. HIST 531, 532 recommended. 4 cr.

676. The Ancient Greek World
Greek history from the Mycenaean period and the Homeric epics through the Classical period, the Persian and Peloponnesian wars, and the Hellenistic period. Emphasis on original sources including Homer, Herodotus, Thucydides, and Greek playwrights. Special attention to an analysis of the contrasts between Spartan and Athenian political systems, the arts in Athens, and the effects of the development of the Athenian thalassocracy. 4 cr.

677. The Roman Republic
Covers pre-Roman Italy, the Etruscans, and the foundation of the Republic. Rome's expansion through the Punic Wars and relations with the Hellenistic kingdoms. Disintegration and final collapse of the Republic. Includes discussion of Roman art, engineering, and political theory. Emphasis on Latin sources in philosophy, history and literature. 4 cr.

678. The Roman Empire
Collapse of the Roman Empire and creation of the Augustan principate. History of the principate through the division of the empire, with discussion of the fall of Rome in the west and the eastern empire through Justinian. Discusses Roman art, literature, philosophy, and religious developments such as the proliferation of mystery religions and the rise of Christianity. 4 cr.

681. Modern China Topics
Issues in modern Chinese history, 1800 to present. Students will read and discuss major works concerning the semester's topic and write several book reports and a term paper. The topic for a given semester will be posted in the history department office. HIST 579 is recommended. 4 cr.

683. Religion in World History
The religious experience of man from the perspective of world history. The major modes of religion; development of the major religious traditions and institutions. 4 cr.

684. History of Southern Africa since 1820
Struggle for political and economic control in the only region of Africa where European groups remain in power Impact of European imperialism, European-settler nationalism, racial conflict, economic competition and industrialization, apartheid, and assimilation with special attention to development of European hegemony Official American policy. 4 cr.

685. The Modern Middle East
From 18th century to the present. Problems created by modernization and reform of the traditional society; conservative reaction to reform, impact of nationalism, and appearance of new ideologies. 4 cr

Group IV. Special Courses

425. Foreign Cultures
Introduction to the culture of a particular nation or region; preparation for experiencing a foreign culture. Consult department for listing of topics. 4 cr.

497. Explorations in Historical Perspectives
Seminar for freshmen and sophomores. In-depth exploration of a particular historical question or topic: for example, the French Revolution, Chaucer's England, or the New Deal. Students should consult with the Department of History for a list of topics and instructors. 4 cr.

500. Introduction to Historical Thinking
Basic skills essential to the study of history: critical reading of historical literature, improvement of written and oral analysis of historical material, and use of library resources. Intensive study of books and documents from varying historical fields and periods. Required of history majors; open to other interested students. 4 cr.

595, 596. Explorations in History
See department listings for semester topic. 1–4 cr.

600. Advanced Explorations in History
See department listings for semester topic. Barring duplication of subject, may be repeated for credit. 1–4 cr.

665. Themes in Women's History
In-depth examination of a selected topic in women's history. Topics may include Women and Health, Women in Modern European Political Theory, Comparative History of Women and Revolution. See *Time and Room Schedule* or history department newsletter for the specific topic. May be repeated for credit with permission of instructor. 4 cr.

695, 696. Independent Study
A) Early American History; B) American National History; C) Canada; D) Latin America; E) Medieval History; F) Early Modern Europe; G) Modern European History; H) Ancient History; I) Far East and India; J) Near East and Africa; K) European Historiography; L) American Historiography; M) Russia; N) World History; O) English History; P) New Hampshire History; Q) Historical Methodology; R) Irish History; S) History of Science. For students showing a special aptitude in history who desire to study an area or subject for which no appropriate course is offered. Prereq: permission. 4 or 8 cr.

772. Studies in Regional Material Culture
Designed to acquaint students with artifacts commonly used in New England homes during the period 1750–1860 and to present these artifacts in their contemporary cultural context, including their relationships with designers, clients, patrons, manufacturers, craftsmen, and consumers. 4 cr. (Not offered every year.)

774. Historiography
Analysis of ancient and modern historians. Required of all entering Ph.D. candidates; open to undergraduates with permission. 4 cr. (Not offered every year.)

775. Historical Methods
Contemporary historical methods. Required of all entering Ph.D. candidates; open to undergraduates with permission. 4 cr (Not offered every year.)

787. Quantitative Methods and Computers for Historians
The historian's use of computers and statistics: opportunities and problems in using and analyzing quantitative sources; elementary statistical techniques; practical applications involving microcomputers and applications programs. No previous knowledge of computers or college mathematics is assumed or required. Prereq: admission as an undergraduate major or graduate student in history; or permission of the instructor. 4 cr. (Not offered every year.)

797. Colloquium in History
Selected topics in American, European, and non-Western history. Required of history majors. Students must select section in the department office at the time of registration. 4 cr.

799. Senior Thesis
Supervised research leading to the presentation of a major research paper. Open only to history majors. Permission of department chairperson required. May not be used as a substitute for the required senior colloquium. 4 cr.

Hotel Administration (HOTL)

(For program description, see page 80.)

Chairperson: Raymond J. Goodman, Jr.
Professor: Raymond J. Goodman, Jr.
Associate Professor: Joseph F. Durocher, Jr.
Assistant Professors: William W. Corcoran, Paula Francese, Sylvia H. Marple

401. Distinguished Lecture Series in Hotel Administration
Designed to introduce students to leading hospitality industry executives, those who have achieved significant praise for their leadership. The speakers represent all segments of the hospitality industry and selected allied industries. They address topics in management, history, strategic planning, organizing, leadership, finance, development, marketing, operations, and current and future challenges facing the industry. 1 cr. Cr/F.

403. Introduction to Food and Beverage Management
Food service management. Application of classroom principles through lectures, field trips, food labs, catering for on-campus functions, and participation in gourmet dinner productions. 4 cr.

518. Managerial Accounting for the Hospitality Industry
Following a review of financial statements and an introduction to the Uniform System of Accounts for Hotel and Restaurants, students learn specific applications of managerial accounting in the hospitality industry. Topics include cash flow analysis, cost management, cost-volume–profit analysis, pricing models, budgeting, and forecasting. Students develop an understanding of course topics as they relate specifically to the hospitality industry through lectures, computer exercises, and papers. Prereq: ACFI 502. (No credit for students who have had ACFI 503.) 4 cr.

595. Internship I
A nontraditional academic experience relating to work experience within the University system. Coordinated by a faculty member who provides supervision (along with an on-site supervisor) through regular class meetings. Includes academic assignments and a written report. Prereq: permission and good academic standing. 1–12 cr. (May be repeated to a maximum of 12 cr.) Cr/F.

654. Lodging Operations Management
Focus on management history, planning, organizing, leadership, and current and future management issues. The course requires students to compare rooms division management in a large hotel with that of a small hotel, including reservations, front office operations and accounting, housekeeping, and auxiliary functions. The complexities and the terminology of the design, management, and maintenance of physical structures used by civil engineers and architects are integral to the course. Guest lectures include hotel general managers and department heads who highlight student projects. Prereq: HOTL 403. 4 cr.

655. Hotel and Restaurant Development
Provides the advanced student with a familiarity of the principles and practices of development and acquisition of hotel, restaurant, and other hospitality businesses, and the real estate development process. Emphasis on market and financial evaluation and decision making relative to economic, ethical, legal, and social aspects of the organization's environment. Group projects involving the preparation of a complete economic feasibility study for hotel or restaurant development or acquisition or repositioning are required. Prereq: HOTL 518; HOTL 654; ACFI 601. 4 cr.

667. Food and Beverage Operations Management
Integration of operations management principles and techniques. Presentation of large-scale theme gourmet dinners; act as managerial consultants to on-campus food service facilities. The lab provides an experiential setting for the application of such principles as marketing, operations management, accounting and organizational behavior through the planning, organizing, coordinating, and execution of two weekend food service events. Prereq: HOTL 403; HOTL 518. Lab. 4 cr.

#685-686. Study Abroad
Open to students studying abroad in the discipline as approved by the hotel administration program director. 1–16 cr. Cr/F.

695. Independent Analysis
Study and research project for honor students to advance knowledge in lodging and food services fields. Prereq: junior standing and permission. 2–16 cr.

696. Supervised Student Teaching Experience
Participants are expected to perform such functions as leading discussion groups, assisting faculty in undergraduate courses that they have successfully completed, or working as peer advisers in the advising center. Enrollment is limited to juniors and seniors who have above-average G.P.A.s. Reflective final paper is required. Prereq: permission of instructor, program director, and director of advising. 1–4 cr. (May be repeated to a maximum of 8 cr.) Cr/F.

698. Topics in Hotel Administration
Special topics and developments in lodging, food services, and other hospitality industries. Prereq: junior standing and permission. Course may be repeated when topics change. 1–4 cr.

700. Hospitality Marketing Management
Students apply basic marketing principles to the competitive environment of service businesses, such as hotels, restaurants, and other hospitality firms. Strong emphasis on consumer behavior, services management theory, and the hospitality marketing mix as they relate to service firms of all types. Course material is presented through a variety of techniques: case studies, lectures, guest speakers, team projects, and written assignments. Prereq: MKTG 651. 4 cr.

703. Strategic Management in the Hospitality Industry
Capstone course, interrelating and applying strategic management concepts to hospitality organizations. Cases from hotel companies, restaurant chains, and other hospitality-related businesses, supplemented by economic and other published information from the industry, are used as departure points for class discussion. Prereq: HOTL 654. 4 cr.

750. Senior Operations Seminar
Allows students to experience and participate in the planning and decision-making process of a full-service hotel; to contribute to and understand the intricacies of managing change while gaining a sensitivity to interdepartmental coordination. Class meets at major metropolitan hotels. Prereq: permission. Special fee. 4 cr.

771. Beverage Management
Examination of purchasing, evaluation, storage, service, and control of alcoholic beverages. Emphasis on wines, although beer, ale, distilled spirits, liqueurs, and mixed drinks are examined. Prereq: HOTL 667 or permission. 4 cr.

795. Internship II
Off-campus work in the hospitality industry for on-the-job skill development. Normally supervision is provided by a qualified individual in the organization with frequent consultation by a hotel program faculty sponsor. A written report is required of the student. Internships may be part-time or full-time, with course credits assigned accordingly. Prereq: permission and good academic standing; junior and senior students only. 1–12 cr. (May be repeated to a maximum of 12 credits.) Cr/F.

799. Honors Thesis/Project
Supervised research leading to the completion of an honors thesis or project; required for graduation from the honors program in hotel administration. 4–8 cr.

Humanities (HUMA)

(For program description, see page 31.)

Coordinator, Humanities Program: David S. Andrew
Core Faculty: David S. Andrew, Arts; Rose T. Antosiewicz, French; Donna B. Brown, Humanities; Warren R. Brown, Political Science; Richard J. Callan, Spanish; Thomas A. Carnicelli, English; Charles E. Clark, History; Patricia A. Emison, Arts; Michael K. Ferber, English; Susan D. Franzosa, Education; Jan V. Golinski, History; Charles H. Leighton, Spanish; Susan Mennel, Humanities; Barbara S. Tovey, Philosophy; Charlotte Elizabeth Witt, Philosophy

401. Introduction to the Humanities
A modular course introducing students to themes and texts taught by faculty members from art, music, literature, philosophy, and history. Each section consists of three 5-week modules that focus on such themes as Fate and Freedom, Innocence and Experience, Work and Play, Humanity and Divinity, and War and Peace. Not for HUMA major credit. 4 cr.

480. What a Text Can Teach
Students examine selected classic texts in the humanities with faculty members representing the arts, music, literature, and philosophy. Through three modules and a team-taught symposium, students investigate how each of these forms of expression contributes to human knowledge and to an understanding of the human being. Not for HUMA major credit. 4 cr.

500. Critical Methods in the Humanities
Critical analysis of works in the humanities. Focuses on major texts; evaluation of secondary literature, research writing, criticism. Required of all HUMA majors. 4 cr.

501. Humanities: The Ancient World
Students develop an appreciation of the roots of Western civilization through the study of ancient art, literature, and philosophy, including Homer, Greek tragedy, Plato, Aristotle, the Bible, Vergil. Weekly lecture series, slides, films. Special fee. 4 cr.

502. Humanities: The Modern World
Contributions to human knowledge and culture from the Early Renaissance through the Enlightenment examined through literature, philosophy, and art. Students study Dante, Castiglione, Machiavelli, Montaigne, Racine, Molière, Pope, Goethe, Wordsworth, Zola, Tolstoy, and examples of art and architecture. Weekly lecture series, slides, films. Special fee. 4 cr.

503. Humanities: The 20th Century
Students gain insight into the nature of contemporary Western civilization through selected examples of literature, philosophy, psychology, and art. Students study and discuss works by writers and artists such as Kafka, Mann, Hesse, D.H. Lawrence, Sartre, C.G. Jung, Picasso, Chagall, di Chirico, Beckett, Mishima, Lillian Smith, Weizenbaum, Weil. 4 cr.

Students enrolling in HUMA 510, 511, 512, or 513 must designate a discussion section in only one of four fields—arts, English, history, or philosophy—corresponding to and satisfying one of four general education categories. To satisfy the general education requirement in fine arts, students should register for 510A, 511A, 512A, or 513A; in works of literature and ideas, 510B, 511B, 512B, or 513B; in historical perspectives, 510C, 511C, 512C, or 513C; in philosophical perspectives, 510D, 511D, 512D, or 513D. For students who complete the entire sequence of HUMA 510, 511, 512, and 513, enrolling in different discussion sections each time, a fifth general education requirement (in foreign culture) will be waived, although additional credit hours will not be granted.

510. Chance, Necessity, and Reason: The Search for the Good Life
What is a human being? How should we explain or understand what happens to us? How ought we to live? This team-taught course examines these important questions by focusing on the literature, art, philosophy, and science of ancient Greece. 4 cr.

511. Fortune, Sin, and Faith: The Search for the Spiritual Life
What is the soul and how is its health related to temptation and also to specifically Christian virtues? How closely does the medieval definition of an eternal God determine good and evil in daily life? To what extent does the hope of immortality affect the practice of writing literature, making art, studying philosophy, and investigating science? This team-taught course examines these important questions by focusing on the literature, art, philosophy, and science from the collapse of the classical world to the rise of capitalism. 4 cr.

512. Reason, Doubt, and Experience: The Search for the Enlightened Life
Exploration of the interrelationships of art, literature, philosophy, and science from the High Renaissance into the 18th century. Study of the works and ideas of such influential figures as Shakespeare and Milton, Raphael and Rembrandt, Galileo, Descartes, Newton, and Hume. Special attention to the following: (1) classical roots of modern imagination; (2) God in the world of the scientific revolution; (3) the uncertain relationship between experience and reality. 4 cr.

513. History, Mind, and the Absurd: The Search for the Meaningful Life
Explores the central paradoxes of our culture in the modern age. Is there such a thing as "progress" and if so what is its nature? What is the relation of conscious and unconscious? Is the contemporary world devoid of meaning? These three questions are examined in literature from Goethe's *Faust* to Samuel Beckett, in the history of science from Darwin to Freud and contemporary chaos theory, in philosophy from Hegel and Marx to Nietzsche and Foucault, and in art from Picasso to Le Corbusier and postmodern architecture. 4 cr.

600. Seminar in the Humanities
Provides an opportunity for in-depth reading, viewing, and/or listening to texts and artifacts. Emphasis on the multiple perspectives and methodologies that can be brought to bear upon these works from several humanistic disciplines. 4 cr.

#607. The American Character: Religion in American Life and Thought
Interdisciplinary study of the American religious experience and its relationship to other aspects of American culture, taught by a team of three specialists, each in a different discipline: American intellectual and cultural history, American literature, and American church history. Central emphasis on several transforming themes of the 19th century and their effects upon the interplay of religion and society. (Also offered as ENGL 607, HIST 607, and RS 607.) 4 cr.

#608. Arts and American Society: Women Writers and Artists, 1850–Present
Team-taught course studying the impact of gender definitions on the lives and works of selected American artists. Considers lesser-known figures such as Fannie Fern, Lilly Martin Spencer, and Mary Hallock Foote as well as better-known artists such as Willa Cather and Georgia O'Keeffe. Prereq: permission or one of the following: WS 401, HIST 566, ENGL 585 or 586, ENGL 685 or 785, or a 600-level art history course. (Also offered as ARTS 608, ENGL 608, and HIST 608.) 4 cr.

#609. Ethnicity in America: The Black Experience in the Twentieth Century
Team-taught course investigating music, literature, and social history of Black America in the period of the Harlem Renaissance, in the Great Depression, World War II, and in the 1960s Special attention to the theme of accommodation with and rejection of dominant white culture. (Also offered as ENGL 609 and MUSI 609.) 4 cr.

#610. Regional Studies in America: New England Culture in Changing Times
Team-taught course investigating some of the major contributions New England has made to American life. Focusing on three periods: the Puritan era, 1620–90; the Transcendental period, 1830–60; and the period of emerging industrialism in the late 19th century. Prereq: second-semester sophomore. (Also offered as HIST 610, ENGL 610, and ARTS 610.) Not for art studio major credit. 4 cr.

650. Humanities and the Law: The Problem of Justice in Western Civilization
Interdisciplinary modular course examines interpretations of the nature of justice, its origins, the role of the professional judiciary, and the relationship of law and ethics. Students take three successive five-week modules during the semester. 4 cr. (Not offered every year.)

651. Humanities and Science: The Nature of Scientific Creativity
Interdisciplinary modular course examines the historical and intellectual foundations of the physical, biological, and human sciences. Students take three successive five-week modules during the semester. 4 cr. (Not offered every year.)

#695. Special Studies in the Humanities
Selected topics not covered by existing courses, with subjects to vary. May be repeated for credit. Prereq: one 400- or 500-level HUMA course or junior standing. 4 cr.

698. Independent Study in the Humanities
Independent study open only to highly qualified juniors and seniors who have completed at least four humanities courses above the 400 level. Requires original research and substantial writing projects under direction of a member of the core faculty of the humanities. Prereq: HUMA junior or senior majors; four HUMA courses above the 400 level. 4 cr.

699. Senior Project in Humanities
Independent study open only to senior humanities majors with individual project approved and supervised by faculty. 2–6 cr.

700. Research Seminar in the Humanities
Provides a context within which students may discuss and receive direction in the course of completing a major research paper. At the end of the seminar, students present their research to the faculty and their fellow students. Restricted to majors. 4 cr.

Hydrology

(For program description, see pages 54, 59; for courses, see Earth Sciences.)

Coordinator: S. Lawrence Dingman

Intercollege Courses (INCO)

401. War
Nature and experience of modern warfare and its historical development; social and biological roots of war; national security and defense concepts and issues; the nuclear age and weapons of mass destruction; the post-Cold War age; philosophical issues. 4 cr.

402. Peace
Investigates (1) military deterrence in theory and practice; (2) alternatives to military deterrence such as diplomacy, international law, conflict resolution, and nonviolent defense; (3) economic and environmental interdependence of nations; and (4) political, cultural, ethical, and religious conceptions of peace. 4 cr.

404. Honors: Freshman Seminar
Introductory course required of all honors program students. A general education course with sections offered in all general education groups except Groups 1 and 2. Special fee. 4 cr.

450. Introduction to Race, Culture, and Power
Explores the ways in which the concept of "race" serves to justify global relationships of

domination and inequality and is embedded in U.S. society. Examines how dominant powers use "culture" to maintain subordination and how subordinated peoples use "culture" to resist exploitation. 4 cr.

480. Art in Society
Brings students into relationship with classical visual and performing arts. Students attend lectures about the arts and live performances of music, theatre, and dance; take trips to visit museums; and view architecture. Students read relevant materials and write about each art work experienced. Special fee. 4 cr.

506. Internship
Based on appropriate career-oriented work experience found with the aid of Career Services' Job Locator Program or with established national/international internship programs, or preprofessional jobs initiated by the student. Prereq: permission; for A.A. degree students only; contact Career Services. 1–4 cr. Cr/F.

585, 586. Foreign Exchange
Juniors and seniors may spend a semester or year in Canada at one of eleven colleges and universities in Nova Scotia or one of nineteen participating institutions in Quebec. Possible disciplines include public relations, hospitality management, and computer science. Eligibility requirements include U.S. citizenship, junior or senior standing, and good academic achievement. For more information contact the Center for International Perspectives.

604H. Honors Senior Thesis
Final requirement for graduation with University Honors. Intended for honors students in majors that do not offer honors work. Open by special permission to other honors students. 4 cr. (May be repeated for a maximum of 8 cr.) IA.

606. Internship
Based on appropriate career-oriented work experience found with the aid of Career Services' Job Locator Program or with established national/international internship programs, or preprofessional jobs initiated by the student. B) College of Life Sciences and Agriculture. C) College of Liberal Arts. D) College of Engineering and Physical Sciences. E) Whittemore School of Business and Economics. F) School of Health and Human Services. May be repeated to a maximum of 8 cr. Prereq: permission; contact Career Services. 1–4 cr. Cr/F.

655–656. London Program
Enables students to pursue a semester or academic year of study in UNH's program in London, England. Students must be admitted into the London program before enrolling in the course. For information and application forms, consult the program secretary, 53 Hamilton Smith Hall. Special fee. Variable to 18 cr. Cr/F. (IA grade will be assigned until official transcript is received.)

685, 686. Study Abroad
Enables students to pursue a semester, summer, or an academic year of foreign study in programs other than those offered by UNH. Students must provide the University Committee on Study Abroad with detailed information about the curriculum and must receive approval from that committee before registration. Credit awarded only upon successful completion of the course of study and after receipt by the committee of an official transcrip . Interested students should consult the Center for International Perspectives. Prereq: permission. Special fee. (Financial aid requires a minimum of 6 credits.) Variable to 16 credits. Cr/F.

#698. Summer Research Project
Guided independent research or student/faculty collaborative research. Open to recipients of summer undergraduate research fellowships or by permission of the Undergraduate Research Opportunities Program. 0–8 cr. (Summer only.)

International Affairs (IA)

Center for International Perspectives
(For program description, see page 83.)

401. International Perspectives: Science, Business, and Politics
Examination of the interaction of developments in science, economics, and politics as they shape international affairs. Topics include science and technology; world trade and investment; politics, cultural values, and ethics in world affairs. Team-taught, modular course. Prereq: permission; IA major. 4 cr.

501. Global Issues in International Affairs
Introduction to basic issues in international and global relations in the contemporary world with some emphasis on the changing nature of relationships among political, social, and economic units. Prereq: permission; IA major. 4 cr.

599. Special Topics
Subjects vary. Course descriptions are available at the Center for International Perspectives. Some semesters, this course will satisfy specific requirements for the dual major in international affairs. For specific information in a particular semester, contact the Center for International Perspectives. 4 cr.

685-686. Foreign Experience
Dual majors will register for IA 685-686 for foreign experience situations not covered by the foreign language departments' Study Abroad (685-686). Most commonly the foreign experience consists of study in a non–English-speaking country for a year, a semester, or a summer (eight weeks). It should be in a country where the language spoken is the one the student presents to satisfy his/her foreign language requirement. The University Committee on International Studies will consider exceptions to this rule upon petition explaining reasons for the alternative experience. Prereq: permission. Special fee. Variable transfer credit. (Financial aid requires a minimum of 6 cr.) Cr/F.

#699. Topics in International Affairs
Special topics course with varying subject matter and format. Study of areas and subjects not covered by existing courses. Center for International Perspectives provides information on current offerings. Recommended as a dual major elective. 4 cr.

701. Seminar in International Affairs
Capstone of the dual major in international affairs. To be taken after completion of the foreign language and foreign experience requirements. Strong emphasis on research and analysis, use of foreign language skills, writing, and criticism. Prereq: IA 501; IA major. 4 cr.

Italian (ITAL)

Department of French and Italian
(For faculty listing, see page 136.)

New students will be assigned to the proper course upon consultation with the section coordinator. Students educated in Italian-speaking countries may not register for courses below the 700 level. No UNH or transfer credit will be given for elementary-level college courses in Italian if students have had two or more years of Italian in secondary school.

The minor in Italian consists of five courses beyond the 401-402 sequence. These courses may include ITAL 503, 504, 631, 651, 652, 795, 796, or one course taught in English in a related field. The minor provides a thorough study of grammar, critical reading and writing, and an introduction to Italian culture and civilization.

401-402. Elementary Italian
For students without previous training in Italian. Aural comprehension, speaking, writing, reading. Labs. (No credit for students who have had two or more years of Italian in secondary school; however, any such students whose studies of Italian have been interrupted for five years should consult the section coordinator about possibly receiving credit.) Special fee. 4 cr.

425. Introduction to Italian Language and Culture
Designed for students interested in exploring Italian language and culture. Language learning through various practical communicative activities. Culture learning by means of guest speakers and visuals. Prepares for ITAL 401-402. Does not satisfy foreign-language proficiency requirement. 4 cr. (Offered summers only. Not offered every summer.)

503-504. Intermediate Italian
A complete review of the fundamentals of grammar and syntax. Selected readings as a general introduction to Italian civilization and culture. Labs and films. Special fee. 4 cr.

621. Italian Literature in Translation, 13th–16th Centuries
Major works of fiction and nonfiction, reflecting ideas and taste during the first three centuries of Italian history. Readings, discussions, papers in English. No more than one course in

English may be counted toward the minor. 4 cr. (Not offered every year.)

622. Italian Literature in Translation, 18th–20th Centuries
Major trends in post-Renaissance thought and culture in Italy. Readings, discussions, papers in English. No more than one course in English may be counted toward the minor. 4 cr. (Not offered every year.)

631. Advanced Italian Conversation and Composition
Rapid review of basic grammatical structures and in-depth study of more complex linguistic patterns. Vocabulary building. Frequent written compositions and oral presentations using materials on contemporary culture taken from the various media. Phonetics and oral/aural skills development in lab and class. Prereq: C or better in ITAL 504 or permission. Special fee. 4 cr.

651. Introduction to Italian Culture and Civilization I: Middle Ages, Renaissance, Baroque
Survey of major representative writers and artists, studied against the backdrop of social and cultural history. Dante, Petrarch, Boccaccio, Machiavelli, Marino. Pre- or coreq: ITAL 631 or permission. 4 cr. (Not offered every year.)

652. Introduction to Italian Culture and Civilization II: Age of Enlightenment, Romanticism, Modernism
Survey of major representative writers and artists, studied against the backdrop of social and cultural history. Parini, Goldoni, Leopardi, Manzoni, Pavese, Calvino. Pre- or coreq: ITAL 631 or permission. 4 cr. (Not offered every year.)

795, 796. Independent Study in Italian Language and Literature
Individual guided study. Prereq: permission. 1–4 cr. (Not offered every semester.)

Japanese (JPN)

Department of German and Russian
(For faculty listing, see page 136.)

New students will be assigned to the proper course on the basis of an achievement test. Transfer credit will not be given for elementary-level college courses in foreign language if a student has had two or more years of the foreign language in secondary school.

401-402. Elementary Japanese
Elements of Japanese grammar. Oral practice and written drills designed to achieve a mastery of basic grammatical patterns. Reading of graded exercises introducing the student to written Japanese (Hiragana and Katakana) and Chinese characters used in contemporary Japan. Labs. No credit for students who have had two or more years of Japanese in secondary school, however, any such students whose studies of Japanese have been interrupted for a significant period of time should consult the department chairperson about possibly receiving credit.) 4 cr.

503-504. Intermediate Japanese
Review of Japanese grammar. Reading of prose and practice in oral and written expression. Labs. Prereq: JPN 402 with a grade of C (2.00) or better or permission of instructor. 4 cr.

631-632. Advanced Japanese
Advanced spoken and written Japanese to attain aural-oral fluency. Advanced reading and composition. Prereq: JPN 504 or permission of instructor. 4 cr.

795, 796. Independent Study in Japanese
Open to highly qualified juniors and seniors. To be elected only with the permission of department chairperson and of the supervising faculty member or members. Barring duplication of subject, may be repeated for credit. 1–4 cr.

Justice Studies (JUST)

(For program description, see page 23.)

601. Field Experience in Justice Studies
Placement by the justice studies coordinator in a position related to the justice system (e.g., criminal courts, corrections, civil courts, law firms, policy-making agencies, law enforcement agencies); weekly seminar meetings. Prereq: permission; seniors only. 4 or 8 cr. Cr/F.

Latin (LATN)

Department of Spanish and Classics
(For program description, see page 31; for faculty listing, see page 184; see also course listings under Classics and Greek.)

New students will initially be assigned to the proper course on the basis of their scores on the College Board Achievement Test or number of years of previous study. Transfer credit will not be given for elementary-level courses in foreign languages if a student has had two or more years of the foreign language in secondary school.

401-402. Elementary Latin
Elements of grammar, reading of simple prose. (No credit for students who have had two or more years of Latin in secondary school; however, any such students whose studies of Latin have been interrupted for a significant period of time should consult the section supervisor about possibly receiving credit.) 4 cr.

501. Review of Latin
Intensive review of Latin grammar and vocabulary. Designed primarily for those whose study of Latin has been interrupted for a year or more and for those who have had only two years of high school Latin. 4 cr.

502. Latin Syntax and Composition
A continuation of LATN 501. Intensive review of Latin syntax; introduction to reading and composition. 4 cr.

503-504. Intermediate Latin
Review. Readings from Cicero, Caesar, Sallust, Livy, Catullus, Horace, Ovid, Plautus, Terence, and Seneca. Prereq: LATN 402 or equivalent. 4 cr.

631-632. Latin Prose Composition
Grammar review; study of Latin prose style; English to Latin translation. Prereq: permission. 4 cr.

#751, #752. Cicero and the Roman Republic
Prereq: permission. 4 cr.

753, 754. Advanced Studies in the Literature of the Golden Age
A) Lucretius; B) Catullus; C) Caesar; D) Sallust; E) Vergil; F) Horace; G) Tibullus; H) Propertius; I) Ovid; J) Livy. Major Roman authors from the dictatorship of Sulla to the death of Augustus. Prereq: permission. 4 cr.

#755, 756. Advanced Studies in the Literature of the Silver Age
A) Seneca the Younger; B) Persius; C) Petronius; D) Lucan; E) Statius; F) Quintilian; G) Martial; H) Juvenal; I) Tacitus; J) Pliny the Younger. Major Roman authors from the reign of Nero to the death of Trajan. Prereq: permission. 4 cr.

791. Methods of Foreign Language Teaching
Objectives, methods, and techniques in teaching, foreign languages from elementary grades through college. Discussion, demonstration, preparation of instructional materials, microteaching of the language skills. Prereq: permission. 4 cr.

795, #796. Special Studies in Latin
A) Minor Authors of the Republic; B) Plautus; C) Terence; D) Minor Authors of the Empire; E) Suetonius; F) Latin Church Fathers; G) Medieval Latin; H) Advanced Latin Composition; I) Introduction to Classical Scholarship; J) Latin Epigraphy; K) Italic Dialects; L) Comparative Grammar of Greek and Latin; M) Roman Law. Topics selected by instructor and student in conference. Prereq: permission. 4 cr.

Linguistics (LING)

(For program description, see page 31.)

See also the list of courses approved for the major or minor at the linguistics entry in the front of this catalog.

505. Introduction to Linguistics
Overview of the study of language: animal com-

munication vs. human language, universal properties of human language Chomsky's innateness hypothesis, language acquisition in children, dialects and language variation, language change. Includes an introduction to modern grammar (phonology, syntax, and semantics) and to scientific linguistic methodology. (Also offered as ENGL 505.) 4 cr.

506. Introduction to Comparative and Historical Linguistics
Major language families (primarily Indo-European) and the relationships among languages within a family. Diachronic studies: methods of writing; linguistic change; glottochronology; etymological studies. Some language training and LING 505 desirable. (Also offered as CLAS 506.) 4 cr.

605. Introduction to Linguistic Analysis
Analysis methods and problem solving in phonology, morphology, and syntax using data from many languages. Emphasis is both practical (learning how to describe the grammar and sound system of a language) and theoretical (understanding languages' behavior). Prereq: LING/ENGL 505, or permission. (Also offered as ENGL 605.) 4 cr.

695. Senior Honors
Open to senior LING majors who, in the opinion of the department, have demonstrated the capacity to do superior work. Prereq: permission. 4 cr.

#779. Linguistic Field Methods
Study of a non–Indo-European language by eliciting examples from an informant, rather than written descriptions of the language. Students learn how to figure out the grammar of a language from raw data. Prereq: ENG/LING 505. (Also offered as ENGL 779.) 4 cr. (Not offered every year.)

#790. Special Topics in Linguistic Theory
Advanced course on a topic chosen by the instructor. Inquire at the English department office for a full course description each time the course is offered. Topics such as word formation, dialectology, linguistic theory and language acquisition, history of linguistics, language and culture, cross-disciplinary studies relating to linguistics. Barring duplication of subject, may be repeated for credit. (Also offered as ENGL 790.) 4 cr.

793. Phonetics and Phonology
Sound system of English and of other languages viewed from the standpoint of modern linguistic theory, including the following topics: the acoustic and articulatory properties of speech sounds, the phonemic repertoires of particular languages, phonological derivations, and prosodic phenomena such as stress and intonation. Prereq: a basic linguistics course or permission. (Also offered as ENGL 793.) 4 cr.

794. Syntax and Semantic Theory
Relationship of grammar and meaning viewed from the standpoint of modern linguistic theory. Emphasis on the syntax and semantics of English, with special attention to the construction of arguments for or against particular analyses. Prereq: a basic linguistics course or permission. (Also offered as ENGL 794.) 4 cr.

795, 796. Independent Study
A) Synchronic Linguistics; B) Diachronic Linguistics; C) Linguistic Theory. For students showing a special aptitude for linguistics who desire to pursue a line of inquiry for which no appropriate course is offered. All requests must be forwarded by the faculty sponsor to the director of the Interdepartmental Linguistics Committee. 1–4 cr.

Management (MGT)

For program description, see page 81.

Chairperson: Allen M. Kaufman
Professors: Stephen L. Fink, Francine S. Hall, Allen M. Kaufman
Associate Professors: John H. Barnett, Gene Boccialetti, Ross I. Gittell, Michael I. Merenda, William Naumes, Rita Weathersby
Lecturers: Ann L. Cunliffe, Joseph E. Michael, Jr.

580. Introduction to Organizational Behavior
Application of behavioral science concepts to work settings in profit and nonprofit organizations. Individual behavior, interpersonal relations, work groups, relations among groups—studied in the context of organizational goals and structure. Experiential focus. For non-business administration majors and minors. No credit for students who have had MGT 611. 4 cr.

602. Values in a Managerial Society
The role and influence of values on management decision making. The conflict between traditional values such as material progress, private property, self-interest, etc., and emerging notions about environmentalism, consumerism, worker and product safety, etc., is examined through case discussions and readings. 4 cr.

611. Behavior in Organizations
Application of behavioral science concepts to work settings and management. Focus on analyzing work situations and developing action recommendations based on understanding behavior. Major topics include individual behavior, interpersonal relations and communication, work groups, relations among groups—studied in the context of organizational goals and structure. Open to WSBE majors only. No credit for students who have had MGT 580. Prereq: all Group A courses and junior standing. 4 cr.

614. Organizational Analysis
Provides a framework and concepts for understanding the nature and functioning of organizations of various types: business, educational, health, social service. Enhances students' skills as organizational members and managers. Case discussions, class exercises, fieldwork. Prereq: juniors and seniors only; prior study of organizational behavior or an equivalent is desirable. 4 cr.

647-648. Business Law I, II
Law of contracts, agency, sales, negotiable instruments, real and personal property, partnership and corporations, with application of the Uniform Commercial Code. Prereq: at least junior standing; permission. 4 cr.

701. Business, Government, and Society
Managerial problem solving and decision making relative to economic, ethical, legal, political, social, and technological aspects of an organization's environment. Case discussion, stakeholder analysis, industrial ecology, and social issues management are important course components. Open to WSBE majors only. Prereq: all Group A and B courses. 4 cr.

703. Strategic Management: Decision Making
Capstone course; integrates the functional discipline skills within the role of the general manager, the external environment of the firm, and the strategic decision process. Uses case analysis, industry and competitive analysis, environmental scanning, and strategic audits. Open to WSBE majors only. Prereq: all Group A and B courses. 4 cr.

712. Managing Organizational Change
Presents conceptual and technical tools to manage the challenge of change, both unpredictable and predictable. Topics include the process of change; change strategies; change agent roles; internal and external; bases of resistance to change; coping with resistance. Prereq: permission; prior study of organizational behavior or an equivalent is desirable. 4 cr.

713. Management Skills
Focuses on the role of the manager, particularly the interpersonal competencies required to work effectively with superiors and subordinates. Participants develop and critique their behavior in situations that involve interviewing, listening, delegation, conflict management, performance appraisal, and handling problem employees. Includes written and verbal presentations, field study, and videotaping. Prereq: permission. 4 cr.

714. Personal Values, Organizational Conflict, and Business Ethics
Analyzes the procedures and objectives of capitalism, the relationship between the business's organizational goals and the values of both the individual manager and society, the assumptions and conceptual foundations of ethical theory and moral philosophy. Prereq: juniors and seniors only; prior study of organizational behavior or equivalent is desirable. 4 cr.

732. Exploration in Entrepreneurial Management
Examines the management of change and innovation, especially the role of entrepreneur in managing new ventures. Characteristic behavioral, organizational, financial, and marketing problems of entrepreneurs and new enterprises. Prereq: permission. 4 cr.

745. International Business
Issues and problems confronting managers in the international economy. Emphasis on problems of working across national borders rather than on those encountered within the framework of different national economies, cultures, and institutions. For managers working in a

multinational enterprise. Prereq: permission. 4 cr

755. International Management
Develops an understanding of international business from the point of view of management and leadership, human resource management, and organizational structure and change. Emphasis on cultural impacts on management thinking and business practice and on skills for managing effectively in international and multicultural environments. Prereq: junior or senior standing. 4 cr.

770. Human Resource Management
Role of personnel administration and human resource management in achieving goals in for-profit and not-for-profit organizations. Functions of management; scope, technique, and current issues of personnel administration; organization of personnel activities and staff. How managers relate to personnel administration and interact with personnel administration staff and services. Prereq: permission. 4 cr.

780. Issues for Men and Women as Managers
With changing work patterns and family roles, male and female managers need new skills and sensitivities to work together effectively. Course seeks to heighten awareness of gender-related attitudes and behaviors as they affect work interactions. Topics include implications of gender expectations for leadership, communication, and career success; impact of stereotypical attitudes and behaviors; issue of sexual attraction and harassment at work; and considerations for balancing career and family. Prereq: senior standing; permission. 4 cr.

785. Career Management
Develops individual career management skills, including corporate career development. Topics include concepts of career development; issues pertaining to career management in organizations. Helpful for students interested in human resource management. Prereq: juniors and seniors only; permission. 4 cr.

798. Topics in Management
Special topics; may be repeated. Prereq: permission. 4 cr

Marketing (MKTG)

(For program description, see page 81.)

Chairperson: Jonathan Gutman
Professors: Charles W. Gross, Jonathan Gutman
Associate Professor: Lucy L. Henke
Assistant Professors: Nancy L. Hansen, James E. Stoddard
Lecturers: Audrey Ashton-Savage, Jacalyn L. Cilley

550. Survey of Marketing
Focuses on marketing as the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational objectives. For non-business administration majors and minors. No credit for students who have had MKTG 651. 4 cr.

651. Marketing
Covers marketing as the process of planning and developing goods and services to satisfy the needs of target customers: consumers, other businesses, and institutions. Focus on how marketing contributes to the firm's goals through product planning, pricing, promotion, and distribution policies. Open to WSBE majors only. No credit for students who have had MKTG 550. Prereq: all Group A courses and junior standing. 4 cr.

750. Strategic Marketing
Practical application of theories taught in MKTG 651. Planning, organization, and control of marketing activities in large national and multinational corporations and small businesses; new product development; pricing policies; selection of domestic and international channels of distribution; interrelationships between marketing, production, and finance. Sound policy formulation and decision making established through analysis of cases. Prereq: a basic marketing course. 4 cr.

751. Advertising and Promotion
Covers advertising and other promotional tools that assist the firm in communicating with its customers. Advertising planning and strategy development in relation to marketing goals; creating and executing advertisements; advertising from a cultural perspective domestically and internationally. Prereq: MKTG 651 or permission. 4 cr.

752. Marketing Research
Formulating research objectives to solve marketing problems: qualitative and quantitative techniques for surveys and marketing experimentation; commonly encountered analyses and models of secondary and primary data to aid marketers in decision making; strengths and limitations of marketing research in the marketing process. Prereq: MKTG 651 or equivalent. 4 cr.

760. International Marketing
Environmental factors affecting international trade: culture and business customs, political and legal factors and constraints, economic and technological development, and the international monetary system. Integration of these with the marketing management functions of market research and segmentation; product, promotion, distribution, and pricing decisions. Prereq: MKTG 651 or permission. 4 cr.

761. Sales Management
Principles and methods of successful personal selling and management of the sales function. Exposure to selling experience in field of student interest; case studies, sales presentations; oral and written analyses of sales management issues. Prereq: MKTG 651 or equivalent. 4 cr.

762. Marketing Workshop
Integrative study of a real marketing situation in a business, nonprofit institution, or government agency. Student teams identify problem, research or collect data, suggest alternative solutions, and submit a recommended course of action. Prereq: MKTG 651; one additional advanced marketing course; permission. 4 cr.

798. Topics in Marketing
Special topics; may be repeated. Prereq: a basic marketing course and permission. 1–4 cr.

Mathematics (MATH)

(For program description, see page 62.)

Chairperson: Kenneth I. Appel
Professors: Kenneth I. Appel, Homer F. Bechtell, Jr., Albert B. Bennett, Jr., David M. Burton, Arthur H. Copeland, Jr., Marie A. Gaudard, Donald W. Hadwin, A. Robb Jacoby, Loren D. Meeker, Eric A. Nordgren, Samuel D. Shore, Donovan H. Van Osdol
Adjunct Professor: Fernand J. Prevost
Associate Professors: William E. Bonnice, David V. Feldman, Joan Ferrini-Mundy, William E. Geeslin, Karen J. Graham, Edward K. Hinson, Ernst Linder, Berrien Moore III, Lee L. Zia
Assistant Professor: Rita A. Hibschweiler
Instructor: Rita Fairbrother
Skills Application Teacher: Martha B. Burton

***301. Elementary Math I**
Beginning algebra including integer operations, solving linear equations, graphing linear functions, solving linear inequalities, systems of linear equations, polynomials, rational expressions and equations, and exponents and radicals. Students with one or more years of college preparatory mathematics are not eligible for credit. 0–4 cr.

***302. Elementary Math II**
Review of elementary algebra, exponents, polynomials, factoring, rational exponents, and absolute value. Solving linear and quadratic equations and inequalities; systems of equations; radical equations. Linear functions and related notions; quadratic functions. Students with two or more years of college preparatory mathematics are not eligible for credit. Prereq: MATH 301 or one year of high school algebra. 0–4 cr.

***305. Elementary Functions**
Properties of elementary functions, including exponential and logarithmic, trigonometric and inverse trigonometric functions. Students with three or more years of college preparatory mathematics are not eligible for credit. Prereq: MATH 302 or two years of high school algebra. 0–4 cr.

419. Evolution of Mathematics
Mathematics from antiquity to the present; origins of the various methods and branches. How and why such concepts as number and geometry evolved. Prereq: two college preparatory mathematics units. Credit offered only to non-mathematics majors and to mathematics education majors. 4 cr.

420. Finite Mathematics
Topics selected from probability, systems of linear equations, matrix algebra, linear programming, mathematics of finance. Not a preparation for calculus. Prereq: two college preparatory math units. Not offered for credit to math majors. 4 cr.

Note for calculus students: Students enrolling in MATH 424 are given a test on algebra during the first week of the semester. Those doing unsatisfactory work will be required to take MATH 305 before enrolling in MATH 424 or to complete remedial assignments in the Mathematics Center (MaC) concurrently with MATH 424.

424A. Calculus for Social Sciences
Real-valued functions and their graphs; derivatives and their applications; antiderivatives and areas; exponentials and logarithms; introduction to multivariable calculus and partial derivatives. CEPS majors not allowed. Primarily intended for majors in College of Liberal Arts and the Whittemore School. Note: students who desire a two-semester calculus course are strongly advised to take MATH 425. Those students who successfully complete MATH 424 (A or B) and subsequently wish to continue their study of mathematics with MATH 426 are required to successfully complete a supplementary module and examination on trigonometric calculus administered by the MaC Center. Prereq: three college preparatory math units. (Not offered for credit if credit is received for MATH 425.) 4 cr. (Fall semester only.)

424B. Calculus for Life Sciences
Real-valued functions and their graphs; derivatives and their applications; antiderivatives and areas; exponentials and logarithms; introduction to multivariable calculus and partial derivatives. CEPS majors not allowed. Primarily intended for majors in College of Life Sciences and Agriculture. Note: students who desire a two-semester calculus course are strongly advised to take MATH 425. Those students who successfully complete MATH 424 (A or B) and subsequently wish to continue their study of mathematics with MATH 426 are required to successfully complete a supplementary module and examination on trigonometric calculus administered by the MaC Center. Prereq: three college preparatory math units. (Not offered for credit if credit is received for MATH 425.) 4 cr. (Spring semester only.)

Note for calculus students: Students enrolling in MATH 425 are given a test on algebra and trigonometry during the first week of the semester. Those doing unsatisfactory work will be required to take MATH 305 before enrolling in MATH 425 or to complete remedial assignments in the Mathematics Center (MaC) concurrently with MATH 425.

425. Calculus I
Calculus of one variable covering limits; derivatives of algebraic, trigonometric, exponential, and logarithmic functions; applications include curve sketching, max-min problems, related rates, and volume and area problems. A special testing program. Prereq: three college preparatory math units including trigonometry. (Not offered for credit if credit is received for MATH 424.) 4 cr.

426. Calculus II
Second course in calculus of one argument, techniques and applications of integration, polar coordinates, and series. Lectures, individual assignments, and a special testing program. Prereq: MATH 425. 4 cr.

527. Differential Equations with Linear Algebra
Fundamental methods of solving first-order equations, essentials of matrix algebra; higher-order linear equations, and linear systems; series solutions; Laplace transforms; selected applications. Prereq: MATH 426. 4 cr.

528. Multidimensional Calculus
Partial differentiation; composite functions and chain rules; maximum and minimum; transformations; vector algebra; vector functions; gradient, divergence, and curl; curves and surfaces; multiple, line, and surface integrals; divergence, Green's, and Stoke's theorem. Prereq: MATH 426. 4 cr.

531. Mathematical Proof
Introduction to reading and writing proofs in mathematics. The basic language of mathematics common to all branches of the subject, especially set theory and basic logic. Prereq: MATH 426. 4 cr.

532. Discrete Mathematics
Counting principles, (including permutations, combinations, pigeonhole principle, inclusion-exclusion principle); big-O relation; graphs, trees, and related topics. Prereq: MATH 531. 4 cr.

621. Number Systems for Teachers
Problem solving; counting and set concepts, number systems (whole numbers, integers, rational, and real numbers); number theory; estimation and mental calculation techniques; and applications requiring calculators and computers. Manipulatives and models are used in a lab setting to illustrate the concepts and properties of the number systems and teach number sense. Credit offered only to prospective elementary or middle/junior high teachers and mathematics education majors in the elementary or middle/junior high school option. 4 cr.

622. Geometry for Teachers
Properties of plane and space figures; tessellations; symmetry; LOGO computer language; nonstandard, English, and metric units of measure; area and perimeter; volume and surface area; estimations and approximations of measurements; constructions; congruence and similarity mappings; problem solving using geometric and algebraic skills, and applications requiring calculators and computers. Manipulatives and models are used in a lab setting to illustrate concepts and properties of geometry. Credit offered only to prospective elementary or middle/junior high teachers and mathematics education majors in the elementary or middle/junior high school option. 4 cr.

623. Topics in Mathematics for Teachers
Logic (valid and invalid forms of reasoning); descriptive statistics (graphs, measures of central tendency, measures of variation); inferential statistics (samplings, distributions, measures of relative standing, simulations); probability (experimental, geometrical, and theoretical); permutations and combinations; probability simulations; problem solving using skills from statistics and probability; mathematical connections and communication review of computer software; and applications requiring calculators and computers. Prereq: permission. Credit offered only to prospective elementary or middle/junior high teachers and mathematics education majors in the elementary or middle/junior high school option. 4 cr. (Offered in alternate years during spring semester.)

644. Probability and Statistics for Applications
Probability concepts, random variables, parameter estimation, hypothesis testing, quality control, and quality assurance. Prereq: MATH 426. (Not offered for credit if credit is received for MATH 735.) 4 cr.

645. Linear Algebra for Applications
Fundamental notions of vector space theory, linear independence, basis, span, scalar product, orthogonal bases. Matrix algebra, solution of systems of linear equations, rank, kernel, eigenvalues and eigenvectors, the LU- and QR-factorizations, and least squares approximation. Prereq: MATH 426. (Not offered for credit if credit is received for MATH 762.) 4 cr.

646. Analysis for Applications
Initial-boundary-value problems of mathematical physics; Sturm-Liouville problems; series expansions by orthogonal functions; Green's functions; numerical methods. Prereq: CS 410; MATH 527; 528 or equivalent computer experience. 4 cr.

647. Complex Analysis for Applications
Complex numbers, analytic functions, Cauchy-Riemann equations, conformal mapping, contour integration, Cauchy's integral formula, infinite series, residue calculus, Fourier and Laplace transforms. Prereq: MATH 528. (Not offered for credit if credit is received for MATH 788.) 4 cr.

656. Introduction to Number Theory
Unique factorization, arithmetic functions, linear and quadratic congruences, quadratic reciprocity law, quadratic forms, introduction to algebraic numbers. Prereq: MATH 531. 4 cr. (Offered in alternate years.)

657. Geometry
Advanced approach to fundamental properties of Euclidean and other geometries. Prereq: MATH 531. 4 cr.

658. Topics in Geometry
Topics selected from among projective geometry, finite geometrics, convexity, transformational geometry, non-Euclidean geometry, and other areas of elementary geometry within the framework of modern mathematics. Prereq: MATH 657. 4 cr. (Offered in alternate years.)

682. Nonlinear Differential Equations
Phase plane analysis of linear and nonlinear autonomous systems; solutions, paths, and critical points; nonlinear conservative systems; limit cycles; periodic solutions; approximate methods; stability of solutions; applications. Prereq: MATH 527. 4 cr. (Offered in alternate years.)

696. Independent Study
Projects of interest and value to student and department. Prereq: permission of faculty supervisor and department chairperson. 1–6 cr.

698. Senior Seminar
Exploration of mathematical topics outside the standard undergraduate curricula. Focus on problem solving, generation of problems, and explaining mathematical concepts. Prereq: Senior standing in mathematics or mathematics education. 4 cr.

703. The Teaching of Mathematics, K–6
Methods of teaching (geometry, number relations and operations, statistics, probability, and problem solving); uses of manipulatives, models, and diagrams; mathematics assessment (objectives, goals, alternative methods of assessment, and purposes of assessment); modeling instructional formats; review and evaluation of textbook series; review of computer software; uses of calculators and computers; teaching reading and writing in mathematics; developing lesson plans; and elementary curriculum projects. Prereq: MATH 621/721; EDUC 500 or permission. 2–4 cr. (Offered in alternate years.)

721. Number Systems for Teachers
Problem solving; counting and set concepts, number systems (whole numbers, integers, rational, and real numbers); number theory; estimation and mental calculation techniques; and applications requiring calculators and computers. Manipulatives and models are used in a lab setting to illustrate the concepts and properties of the number systems and to teach number sense. Prereq: permission. Credit offered only to M.Ed., M.A.T., and certified-only students. 4 cr.

722. Geometry for Teachers
Properties of plane and space figures; tessellations; symmetry; LOGO computer language; nonstandard, English, and metric units of measure; area and perimeter; volume and surface area, estimations and approximations of measurements; coordinate geometry; equations and inequalities; linear and exponential functions, constructions; congruence and similarity mappings; problem solving using geometric and algebraic skills, geometric-algebraic connections, and applications requiring calculators and computers. Manipulatives and models are used in a lab setting to illustrate concepts and properties of geometry. Prereq: permission; MATH 721. Credit offered only to M.Ed., M.A.T., and certified-only students. 4 cr.

#723. Topics in Mathematics for Teachers
Logic (valid and invalid forms of reasoning), descriptive statistics (graphs, measures of central tendency, measures of variation); inferential statistics (samplings, distributions, measures of relative standing, simulations); probability (experimental, geometrical, and theoretical), permutations and combinations; probability simulations; problem solving using skills from statistics and probability; mathematical connections and communication review of computer software; and applications requiring calculators and computers. Prereq: permission. Prereq: MATH 721 or 722. Credit offered only to non-mathematics majors and to mathematics education majors (elementary, middle/junior high school option). 4 cr.

735. Probability
Probability measures; random variables; important distributions; moment-generating functions; multivariate distributions; functions of random variables; limit theorems. (Not offered for credit if credit is received for MATH 644.) Prereq: MATH 528. 4 cr.

736. Statistics
Parameter estimation, confidence intervals, minimum-variance unbiased estimation, hypothesis testing, likelihood ratio tests, topics from statistical methods. Prereq: MATH 735 (or MATH 644, 528, and permission). 4 cr.

739. Linear Statistical Models
Estimation, testing, and diagnostic methods for linear regression; analysis of variance; and analysis of covariance. Some use of packaged statistical computer programs. Prereq: MATH 644 or MATH 736; and MATH 645 or MATH 762. 4 cr.

740. Experimental Design
Randomized blocks, Latin square designs, factorial designs, fixed effects and random effects models, fractional factorial designs, response surface methodology. Applications to physical, engineering, and agricultural sciences. Prereq: MATH 739. 4 cr.

742. Applied Statistical Methods
Topics chosen from multivariate methods, nonparametric methods, categorical data analysis, samplings theory, decision theory, reliability, statistical process control, and applications to biostatistics or industry. Emphasis on data analysis. Prereq: MATH 644 or 736. 4 cr.

744. Applied Data Analysis
Linear regression, factorial experiments, randomized block designs, 2^k factorial designs, statistical quality control, Taguchi methods. Prereq: MATH 644 or MATH 736. (Not offered for credit if credit received for MATH 739 or 740.) 4 cr

745-746. Foundations of Applied Mathematics
Basic concepts and techniques of applied mathematics intended for graduate students in mathematics, engineering, and the sciences. Fourier series and transforms, Laplace transforms, optimization, linear spaces, eigenvalues, Sturm-Liouville systems, numerical methods, conformal mapping, residue theory. Prereq: MATH 527, 528, or equivalent. 4 cr.

753. Numerical Methods and Computers
Use of scientific subroutine and plotter routine packages, floating point arithmetic, polynomial and cubic spline interpolation, implementation problems for linear and nonlinear equations, random numbers and Monte Carlo method, Romberg's method, optimization techniques. Selected algorithms programmed for computer solution. Prereq: MATH 426; CS 410C, 412, or 610. (Also offered as CS 753.) 4 cr.

754. Introduction to Scientific Computing
Introduction of the tools and methodology of scientific computing via the examination of interdisciplinary case studies from science and engineering. Emphasis on numerical approaches to solving linear systems, eigenvalue-eigenvector problems, and differential equations. Problems are solved on various hardware platforms using a combination of software and data visualization packages. Prereq: MATH 425; MATH 426; CS 410, 412, or 416; MATH 527 or 645 or permission. (Also offered as CS 754.) 4 cr.

761. Abstract Algebra
Basic properties of groups, rings, fields, and their homomorphisms. Prereq: MATH 531. 4 cr.

762. Linear Algebra
Abstract vector spaces, linear transformations and matrices, determinants, eigenvalues and eigenvectors. Prereq: MATH 761. (Not offered for credit if credit is received for MATH 645.) 4 cr.

764. Advanced Algebra
Topics selected from rings, modules, algebraic fields, and group theory. Prereq: MATH 761. 4 cr. (Offered in alternate years.)

767. One-Dimensional Real Analysis
Theory of limits, continuity, differentiability, integrability. Prereq: MATH 531. 4 cr.

768. Advanced Analysis
Metric spaces; sequences and series of real functions; uniform convergence; Fourier Series; differentiability of mappings from n-spaces to m-spaces. Prereq: MATH 767. 4 cr. (Offered in alternate years.)

776. Logic
Induction and recursion; sentential logic; first-order logic; completeness, consistency, and decidability; recursive function. Prereq: MATH 531. 4 cr. (Offered in alternate years.)

783. Set Theory
Axiomatic set theory, including its history, Zermelo-Fraenkel axioms; ordinal and cardinal numbers; consistency, independence, and undecidability. Prereq: MATH 531. 4 cr. (Offered in alternate years.)

784. Topology
Open sets, closure, base, and continuous functions; connectedness, compactness, separation axioms, and metrizability. Prereq: MATH 531. 4 cr.

788. Complex Analysis
Complex functions, sequences, limits, differentiation and Cauchy-Riemann equations, elementary functions, Cauchy's theorem and formula, Taylor's and Laurent's series, residues, conformal mapping. Prereq: MATH 767. (Not offered for credit if credit is received for MATH 647.) 4 cr

791. The Teaching of Mathematics, 7–12
Methods for teaching junior high and secondary school mathematics (prealgebra, algebra, geom-

etry, trigonometry, statistics, probability, precalculus, discrete mathematics, and calculus); survey of instructional materials; models for mathematical concepts; uses of graphing calculators and computers; teaching reading and writing in mathematics; instructional formats; methods of assessment; problem solving; theories of learning mathematics; review of computer software and uses of computers; review and evaluation of curriculum materials and resources; developing lesson plans; and professional organizations and publications. Prereq: EDUC 500; MATH 426; and permission. 4 cr.

#796. Topics in Mathematics
New or specialized courses not covered in regular course offerings. Prereq: permission. (May be repeated up to 8 cr.) 4 cr.

Mechanical Engineering (ME)

(For program description, see page 65.)

Chairperson: Kenneth C. Baldwin
Professors: David E. Limbert, Godfrey H. Savage
Associate Professors: Kenneth C. Baldwin, Barbaros Celikkol, Barry K. Fussell, Todd Stuart Gross, Robert Jerard, James E. Krzanowski, John Philip McHugh, William Mosberg, M. Robinson Swift, David W. Watt, John A. Wilson
Assistant Professor: Michael R. Gosz

441. Engineering Graphics
Fundamentals of engineering drawing and descriptive geometry developed for graphical communication of technical information and solution of spatial problems. 4 cr.

503. Thermodynamics
Laws of thermodynamics and their relation to working substances. Prereq: MATH 426. 3 cr.

523. Introduction to Statics and Dynamics
Overview of statics and dynamics; two- and three-dimensional force systems; laws of equilibrium; moments of area; volume; inertia; stresses and strains; particle and rigid body dynamics; fixed and moving reference frames; impulse-momentum principles; work-energy relationships. Prereq: MATH 426; PHYS 407. Not for ME majors. 3 cr.

525. Mechanics I
Introduction to statics. Two- and three-dimensional force systems, the concept of equilibrium, analysis of trusses and frames, centroids, bending moment and shear force diagrams, friction, and stress-strain relationships. Prereq: MATH 425 and 426; PHYS 407. 3 cr.

526. Mechanics II
Introduction to strength of materials. Analysis of members under torsion, axial, shear and bending stresses, superposition of stresses, stability of columns. Prereq: ME 525. 3 cr.

#541. Manufacturing Processes and Design
Manufacturing drawings, sketching basic mechanisms found in machine shops, operation of basic machine tools. Lab. 4 cr.

564. Materials II
Relationship of atomic, micro, and macro structures of materials to their mechanical properties, processing for structure; materials use in an evolving technology. Prereq: ME 661. 3 cr.

603. Heat Transfer
Analysis of phenomena; steady-state and transient conduction, radiation, and convection; engineering applications. Co- or prereq: ME 608. 3 cr.

608. Fluid Dynamics
Dynamics and thermodynamics of compressible and incompressible fluid flow; behavior of fluids as expressed by hydrostatic, continuity, momentum, and energy equations. Prereq: ME 503; ME 627. (No credit for students who have taken ME 508.) 3 cr.

627. Mechanics III
Introduction to particle and rigid body dynamics. Rectilinear and curvilinear motion, translation and rotation, momentum and impulse principles, and work-energy relationships. Prereq: ME 525 or permission. (No credit for students who have taken ME 627.) 3 cr.

629. Kinematics and Dynamics of Machines
Kinematic and dynamic analysis of mechanisms and their synthesis. Applications to reciprocating engines; balancing and cam dynamics are developed. Prereq: ME 627. 3 cr.

643. Elements of Design
Analysis, synthesis, and design of machine elements and systems. Development of engineering judgment; selection of materials stress and failure analysis; kinematic arrangements; design for finite and infinite life. Open-ended design problems unify course topics. Prereq: ME 526; ME 564. 3 cr.

646. Experimental Measurement and Data Analysis
Basic and advanced techniques of engineering and scientific parameter measurement including statistical data and error analysis, curve fitting, calibration and application of transducers, and technical writing. Laboratory experiments draw on concepts from mechanics, thermodynamics, and fluid mechanics. Prereq: ME 503, 525, 526, 608, 627. 4 cr.

661. Introduction to Materials Science
The concepts of materials science and the relation of structure to material properties. Atomic structure, bonding material transport, mechanical properties of materials, solidification, phase diagrams, solid state transformations, and corrosion and oxidation. Laboratory exercises are carried out to demonstrate the basic concepts of the course. Prereq: ME major; CHEM 405 or equivalent. (No credit for students who have had ME 561, 564, 545.) 4 cr.

670. Systems Modeling, Simulation, and Control
Lumped parameter models for mechanical, electrical, thermal, fluid, and mixed systems. Matric presentation, eigenvalues, eigenvectors, time domain solutions, frequency response plots, and computer simulations are used to explore system response. Design of system for desired responses. Introduction to feedback control, stability, and performance criteria. Prereq: EE 535, ME 608, MATH 527. 4 cr.

695. Special Topics in Mechanical Engineering
Course topics not offered in other courses. May be repeated for credit. 2–4 cr.

696. Mechanical Engineering Projects
Analytical, experimental, or design projects undertaken individually or in teams under faculty guidance. May be repeated for credit. 1–4 cr.

#697. Mechanical Engineering Seminar
Study and discussion of engineering topics, with student-faculty participation. May be repeated for credit. 1 cr.

701. Macroscopic Thermodynamics
Thermodynamic principles using an analytic, postulational approach and Legendre transformations to obtain thermodynamic potentials. 4 cr.

702. Statistical Thermodynamics
Macroscopic thermodynamic principles developed by means of microscopic analysis. Prereq: ME 503. 4 cr.

705. Thermal System Analysis and Design
Engineering design of thermal systems that involve real problems and analysis of performance of the design. Design criteria include function, performance, optimization, economy, safety, and others as appropriate for the system. Required for ME seniors. (No credit if credit has been received for ME 605.) Prereq: ME 603. Lab. 3 cr.

707. Analytical Fluid Dynamics
Kinematics of flow; constitutive relationships; development of the Navier-Stokes equations; vorticity theorems; potential flow. Prereq: ME 608. 4 cr.

708. Gas Dynamics
Study of one-dimensional subsonic and supersonic flows of compressible ideal and real fluids. Wave phenomena; linear approach to two-dimensional problems; applications in propulsion systems. Prereq: ME 503. 4 cr.

709. Computational Fluid Dynamics
Review of matrix methods; basics of finite-differential methods for differential equations; exact solutions to differential equations; basics of spectral methods, including the Galerkin, tau, and collection methods, spectral accuracy, and stability; Navier-Stokes solvers, treatment of boundary conditions, complex geometries, computational examples. 4 cr.

#710. Solar Heating Systems
Analysis and computer modeling of solar radiation as an energy source for heating. Phenomena, availability, collection, performance, and economy of solar energy for heating systems. Prereq: ME 603. 3 cr.

711. Coherent Optical Methods
Introduces electro-optic experimental techniques in mechanics. Optical fundamentals including elements of scalar diffraction theory, interferometry, holography, Doppler shifts, coherence, and laser speckle. Applications including mechanical strain measurements, vibrational mode determination, fluid pressure, temperature measurements, and fluid velocity measurements. Concepts from course are demonstrated in lab. Prereq: permission. 3 cr.

#717. Cryogenics
Phenomena and processes at very low temperatures. Basic engineering sciences applied to problems of low-temperature refrigeration, liquefaction, separation, and storage; transport of cryogenic fluids; measurement systems; vacuum technology. Prereq: ME 503. 4 cr.

723. Advanced Dynamics
Classical dynamics oriented to contemporary engineering applications. Review of particle dynamics. Hamilton's principle and the Lagrange equations. Kinematics and dynamics of rigid bodies, gyroscopic effects in machinery and space structures. 4 cr.

724. Vibration Theory and Applications
Discrete vibrating systems. Linear system concepts; single-degree-of-freedom system with general excitation. Matrix theory and eigenvalue problems. Many degrees of freedom, normal mode theory for free and forced vibration. Numerical methods; introduction to continuous systems; applications to structural and mechanical systems. 4 cr.

#726. Experimental Mechanics
Experimental methods and theoretical bases applied to measurement of stress, strain, and motion. Transmitted and scattered-light photoelasticity, strain gage applications, brittle coating and grid techniques, dynamic measurements, and associated instrumentation. 4 cr.

727. Advanced Mechanics of Solids
Stress, strain, stress-strain relations, anisotropic behavior, introduction to elasticity, plane stress/strain, bending and torsion of members with general cross-sections introduction to thin plates and shells, energy methods. 4 cr.

730. Mechanical Behavior of Materials
Elastic and inelastic behavior of materials in terms of micro- and macromechanics. Stress, strain, and constitutive relations related to recent developments in dislocation theory and other phenomena on the atomic scale and to the continuum mechanics on the macroscopic scale. Elasticity, plasticity, viscoelasticity, creep, fracture, and damping. Anisotropic and heterogeneous materials. 4 cr.

731. Fracture and Fatigue Engineering Material
Reviews fundamentals of linear elastic fracture mechanics and strain energy release rate analyses. Discusses basic methods of design for prevention of failure by fast fracture and fatigue for metals, ceramics, and polymers with attention to the effect of material properties and subsequent property modification on each design approach 4 cr.

741. Nonlinear Systems Modeling
Modeling of hydraulic, pneumatic, and electromechanical systems. Solution methods including linearization and computer simulation of nonlinear equations. Development of methods of generalizing the nonlinear models for design purposes. (Also offered as EE 741.) 4 cr.

747. Experimental Measurement and Modeling of Complex Systems
Experimental measurements for evaluation, design, and control of mechanical, electrical, and thermal/fluid phenomena. Emphasizes the dynamic response of both sensors and systems and the interactions between physical processes. Experimental examples are drawn from mechanics, material science, thermal-fluid science, and controls. Prereq: ME majors only; ME 503, 525, 526, 603, 608, 627, 661, 670. 4 cr.

751. Naval Architecture in Ocean Engineering
Selected topics in the fundamentals of naval architecture pertinent to ocean engineering, including hydrostatic characteristics, basics of resistance and propulsion and rules and regulations for surface, semisubmersible, and submersible marine vehicles. Computer applications. Prereq: ME 525; ME 608; /or permission. (Also offered as OE 751.) 4 cr.

752. Submersible Vehicle Systems Design
Conceptual and preliminary design of submersible vehicle systems; submersibles, environmental factors, hydromechanic and structural principles, materials, intra/extravehicle systems, operating considerations; predesign and design procedures. Design projects selected and completed by student teams. Prereq: permission. (Also offered as OE 752.) 4 cr.

755. Senior Design Project I
Part I of a year-long open-ended design experience required for all ME seniors. Undertaken individually or in teams under faculty guidance. Part I emphasizes project proposal development, design alternative evaluation, and a final design report. Typically taken in semester 7. TECH 797 or ME 751-752 may be substituted for this experience. (No credit if credit has been received for ME 656). 4 cr.

756. Senior Design Experience
Part II of a year-long, open-ended design experience required for all mechanical engineering seniors. Undertaken individually or in teams under faculty guidance. Part II emphasizes the development and testing of the design proposed in Part I Typically taken in semester 8. TECH 797 or ME 751-752 may be substituted for this course. (No credit if credit has been received for ME 656). 4 cr.

#757. Coastal Engineering and Processes
Introduction to small amplitude and finite amplitude wave theories. Wave forecasting by significant wave method and wave spectrum method. Coastal processes and shoreline protection. Wave forces and wave structure interaction. Introduction to mathematical and physical modeling. Prereq: ME 608 or permission. (Also offered as CIE 757 and OE 757.) 3 cr.

760. Physical Metallurgy I
Introduction to physical metallurgy: dislocations, thermodynamics of materials, diffusion, phase transformations, and strengthening mechanisms in solids. Prereq: ME 661 or permission. Lab. 4 cr.

761. Diffraction and Imaging Methods in Materials Science
Introduction to x-ray diffraction and electron microscopy. Basic crystallography; reciprocal lattice; x-ray and electron diffraction; x-ray methods; transmission and scanning electron microscopy. Prereq: CIE 622 or ESCI 512. Lab. 4 cr.

762. Electronic Properties of Materials
Introduction to the electronic properties of materials and their application in electronic devices. Crystallography, atomic bonding and energy band diagrams for semiconductors; intrinsic and extrinsic semiconductors; the p-n junction; diodes and transistors. Methods used in the manufacture of semiconductor devices, such as ion implantation, thermal oxidation, metallization, and packaging. Prereq: PHYS 407, 408; MATH 527; CHEM 405 or 403-404. 3 cr.

#766. Physical Ceramics
Characteristics of crystalline and noncrystalline ceramic solids; defect structures; diffusion in ceramic materials; nucleation and crystal growth, spinodal decomposition, and solid-state reactions; kinetics of grain growth; sintering, and vitrification. Prereq: permission. 4 cr.

771. Linear Systems and Control
Fundamentals of linear system analysis and design in both continuous and discrete time. Design of feedback control systems. Topics include modeling; time and frequency analysis; Laplace and Z transforms; state variables; root locus; digital and analog servomechanisms; proportional, integral, and derivative controllers. Includes demonstrations and computer simulations. Prereq: senior standing in EE or ME or permission. (Also offered as EE 771.) 3 cr.

772. Control Systems
Extension of ME 771 to include more advanced control system design concepts such as Nyquist analysis; lead-lag compensation; state feedback; parameter sensitivity; controllability; observability; introduction to nonlinear and modern control. Includes interactive computer-aided design and real-time digital control. Prereq: ME 771 or permission. (Also offered as EE 772.) Lab. 4 cr.

774. Computer-Aided Engineering
Data acquisition and experiment control, multivariable data curve fitting, computer simulation of lumped systems based on analytical and data-based models, graphical display of data and simulation results. Interactive graphics and 3-D line drawing of objects for finite element analysis. Introduction to finite element analysis and survey of other software available. Prereq: ME 747 or permission. 3 cr.

#781. Mathematical Methods in Engineering Science I
Solution of discrete and continuous systems. Review of calculus, linear algebra, complex

numbers, Fourier series, differential and partial differential equations with examples from acoustics, vibration theory, hydrodynamics, elasticity, solid mechanics, transport theory, and particle mechanics. 4 cr.

783. Geometric Modeling
Topics covered include curves, surfaces, solids, analytic and relational properties, intersections, transformations, and solid modeling. Emphasizes applications in computer graphics and CAD/CAM systems. Prereq: familiarity with calculus, analytic geometry, vectors, matrix methods, and computer programming; permission. 4 cr.

786. Introduction to Finite Element Analysis
Topics include basic matrix theory, Galerkin method, direct stiffness method, calculus of variations, development of finite element theory, and modeling techniques. Applications in solid mechanics, heat transfer, fluids, dynamics, and electromagnetic devices, via both commercially available codes and student-written codes. Prereq: CS 410F; ME 603;/or permission. 3 cr.

795. Special Topics in Mechanical Engineering
New or specialized courses and/or independent study. May be repeated for credit. 2–4 cr.

797. Honors Seminar
Course enrichment and/or additional independent study in subject matter pertaining to a 600- or 700-level ME course other than ME 695, 696, 697, or 795. 1 cr.

Medical Laboratory Sciences (MLS)

(For program description, see page 70.)

Chairperson: Christine L. Bean
Associate Professors: Jae Kang, Karol A. LaCroix
Adjunct Associate Professor: Walter Noll, M.D.
Assistant Professors: Christine L. Bean, Joyce Stone
Adjunct Assistant Professors: Ann Downing, Frank Polito, Jill Polito, Deborah E. Zuaro

401. Introduction to Medical Laboratory Science
Functions and responsibilities of medical technology as a unit of the health team. Lectures, films, demonstrations, and field trips. 1 cr.

500. Introduction to Medical Laboratory Methods and Techniques
Overview of medical laboratory procedures routinely used to diagnose common diseases such as anemia, mononucleosis, heart disease, leukemia, and diabetes. Emphasis on the clinical application of certain tests along with their theory and practice. Students learn proper techniques for use in a medical laboratory to assure accuracy and precision of patient results. Other topics include laboratory safety, instrumentation, and quality assurance. Lab. Special fee. Prereq: CHEM 403-404 or CHEM 405. 4 cr.

602. Medical Laboratory Seminars
Clinical case study presentations emphasizing the role of the laboratory in diagnosing and treating disease and in maintaining health. Prereq: senior MLS majors only or permission. 2 cr.

610. Laboratory Management
Introduction to laboratory management, supervision, and education. Lectures, discussions, and student projects cover financial concerns, personnel management, and teaching skills. Prereq: senior MLS majors or permission. 4 cr.

650A. Phlebotomy Theory
Procedures for blood collection by venipuncutre and capillary puncture. Emphasis on professionalism, safety, equipment, laboratory orientation, and complications of the procedures. Students will observe all techniques and have a limited opportunity to perform them. Prereq: sophomore MLS majors only or permission. 1 cr.

650B. Phlebotomy Clinical Internship
Students obtain experience and proficiency in blood collection techniques at a health care facility (100–120 hours). Prereq: MLS 650A; sophomore MLS majors or permission. 1 cr.

652. Clinical Hematology
Routine hematological procedures, both manual and automated. Analysis of white blood cells, red blood cells, and platelets; hemostasis techniques. Prereq: MLS majors or permission. Lab. Special fee. 5 cr.

653. Clinical Immunohematology
Routine blood-banking procedures, including blood typing, antibody screening, cross-matching, and confirmatory testing on blood units. Prereq: MLS majors or permission. Special fee. 3 cr.

654. Clinical Chemistry
Laboratory safety, mathematics, introduction to instrumentation, and quality control. Clinical significance, evaluation, and performance of manual procedures. Includes analysis of plasma glucose, BUN, creatinine, electrolytes, enzymes, cholesterol, bilirubin, and uric acid determination. Prereq: CHEM 403-404. Special fee. 5 cr.

655. Urinalysis and Body Fluids
Review of routine and special tests on urine and other body fluids. Emphasis on physical, chemical, and microscopic analytes and their relationship to health and disease. Prereq: MLS majors or permission. 2 cr.

696. Independent Study
In-depth studies under faculty supervision. Prereq: junior standing; approval of the major adviser and the faculty of the area concerned. 2–4 cr.

700. Toxicology
Overview of effects of environmental pollutants, medications, and abused substances on human health. Emphasizes the mechanisms, assessment, and management of their toxicology. Prereq: one semester of organic chemistry, biochemistry, or permission. 4 cr.

720. Clinical Mycology-Parasitology
Clinical laboratory identification and pathology of human mycology and parasitology infections. Classification and diagnosis of clinically significant viruses. Prereq: MICR 602 or permission. Lab. 4 cr.

751. Advanced Clinical Microbiology
Advanced clinical bacteriological procedures, fluorescent techniques, and special procedures. Mycology and parasitology identification and testing. Special fee. Prereq: senior MLS majors only. 5 cr.

752. Advanced Hematology
Special hematology procedures including diagnostic staining, advanced hemostasis studies, and evaluation of blood cells in disease states. Special fee. Prereq: senior MLS majors only. 5 cr.

753. Advanced Immunohematology
Advanced blood-banking procedures, including antibody identification, and component therapy. Principles and procedures for detecting disorders of cellular and humoral immunity. Special fee. Prereq: senior MLS majors only. 5 cr.

754. Advanced Clinical Chemistry
Theory, operation, evaluation, and maintenance of automated chemistry systems. Advanced laboratory analysis of body fluid chemistries including enzymology, isotopes, hormones, blood gases, and toxicology. Data analysis, computerization. Special fee. Prereq: senior MLS majors only. 5 cr.

761. Clinical Microbiology Internship
Advanced instruction in clinical bacteriology, mycology, parasitology, and virology at local hospital or reference laboratory. Isolation, identification, and antibiotic sensitivities for common pathogens are emphasized. Prereq: MICR 602; MLS majors only. 16 cr.

762. Clinical Hematology Internship
Advanced instruction in hematology and hemostasis at a local hospital or reference laboratory. Specialized tests such as automated cell counts, cytochemical analyses, cell markers, and specialized hemostasis are covered. Prereq: MLS 652; MLS majors only. 16 cr.

763. Clinical Immunohematology Internship
Advanced instruction in clinical immunohematology at a local hospital or reference laboratory. Pre-transfusion testing, donor screening, phlebotomy, and component therapy emphasized. Prereq: MLS 653, MLS majors only. 16 cr.

764. Clinical Chemistry Internship
Advanced instruction in clinical chemistry at a local hospital or reference laboratory. Analysis of carbohydrates, proteins, enzymes, lipids, hormones, electrolytes, blood gases, and drugs. Prereq: MLS 654; MLS majors only. 16 cr.

Microbiology (MICR)

(For program description, see page 47.)

Chairperson: Richard P. Blakemore
Professors: Richard P. Blakemore, William R. Chesbro, Thomas G. Pistole, Frank G. Rodgers, Robert M. Zsigray
Assistant Professor: Aaron B. Margolin

501. Public Health Microbiology
Medical microbiology with emphasis on immunology, pathogenic bacteriology, parasitology, animal virology, and the incidence and control of human communicable diseases. Laboratory techniques for identification of important pathogenic microorganisms and disease diagnosis. Special fee. Lab. 4 cr.

503. General Microbiology
Principles of microbiology; morphology, physiology, genetics, culture, and classification of bacteria and other microorganisms; and their relationships to agriculture, environment, industry, sanitation, and infectious diseases. Prereq: CHEM 401-402 or equivalent. Special fee. Lab. 5 cr.

600. Applied Microbiology and Biotechnology
The genetic, physiological, and metabolic characteristics of microorganisms that are used to improve the quality of water, food, and air or to produce substances for use in biomedical applications, as well as the use of the microbes themselves as pesticides and food, and in vaccines and bioremediation. Emphasis on the technology of detection, quantification, control, genetic manipulation, and cultivation of useful microbes. Prereq: MICR 503. Lab. Special fee. 4 cr.

602. Pathogenic Microbiology
Morphologic, cultural, biochemical, serologic, and pathogenic characteristics of microorganisms causing human and animal diseases. Discussion of clinical presentation in host and laboratory diagnoses. Prereq: MICR 503. Special fee. Lab. 5 cr.

702. Infectious Disease and Health
Principles underlying the nature of infectious agents; the diseases they cause; pathogenic strategies; response of the host; intracellular parasitism; epidemiology; control measures including vaccines and chemotherapy; action of antimicrobial chemotherapeutic agents; pharmacokinetics and drug metabolism. Well-established pathogens and newer, emerging human and animal disease agents are covered. Prereq: MICR 602; permission. 4 cr.

704. Microbial Genetics
Expression and transfer of genetic elements (chromosomal and nonchromosomal) in prokaryotic and eukaryotic microorganisms; consideration of factors influencing public health, industry, the environment, and society. Prereq: MICR 503; BCHM 658 (Also offered as GEN 704.) Special fee. Lab. 4 cr.

705. Immunology
Examination of the immune response in vertebrates. Characterization of the major components of the immune system; study of host defense mechanisms and immunopathology. Serological and animal laboratory studies. Prereq: MICR 503; permission. Special fee. Lab. 5 cr.

706. Virology
Principles of animal and selected plant and bacterial virology in relation to infection and disease. Emphasis on the molecular biology of viruses, viral replication, isolation, propagation, assay, pathogenesis, diagnosis, detection, epidemiology, and control. Prereq: MICR 503. Special fee. Lab. 4 cr.

707. Marine Microbiology
Characterization of microorganisms in the sea including taxonomy, physiology, and ecology; sampling, enumeration, distribution; and effects of marine environment upon microbial populations. Prereq: MICR 503 and organic chemistry. Special fee. Lab. 4 cr.

709. Advanced Virology
Provides in-depth study of virology. Selected RNA, DNA, retroviruses, and non-retroviruses capable of causing cancer. Enables students to (1) understand genetic regulatory events occurring during virus-cell interactions and to (2) understand the specific pathogenicity, epidemiology, prevention, and control of selected (model) viruses. Prereq: MICR 706; permission. Lab. Special fee. 4 cr. (Not offered every year.)

710. Electron Microscopy and Microbial Cytology
Ultrastructure of eukaryotes, prokaryotes, and viruses. Operation of transmission and scanning electron microscopes; manipulation of instrumentation and specimens. Application of shadowing, negative staining, embedding, thin-sectioning, labeling, freeze-fracture/etching to biological specimens; photographic techniques; interpretation of micrographs. Role of bacterial appendages; cell membranes and cell walls; cytoplasmic inclusions; cell division and sporulation and virus ultrastructure. Project work. Prereq: MICR 503; permission. Special fee. Lab. 5 cr. (Not offered every year.)

713. Microbes and the Environment
Principles of microbial ecology in relation to human ecology. Habitats in which microbes have influence: plants and animals as hosts; aquatic and terrestrial environments. Environmental signaling and behavioral or metabolic responses by independent cells and social microbes. Methods of evaluating microbial community composition and structure. Enrichment, isolation, and consideration of particular microbial groups important in the biogeochemistry of major elements and metals. Microbes in the context of human activities including waste treatment, design of biodegradable materials, biomining, release of radiatively important trace gases, and bioremediation. Prereq: MICR 503; BCHM 658 or 751; permission. Special fee. Lab. 4 cr.

#714. Water Pollution Microbiology
Application of general principles of microbial ecology to water pollution. Study of viruses, bacteria, algae, and parasites found in contaminated water: their genetics, physiology, occurrence, detection, and health implications in addition to the organic and inorganic chemistry of the water they are found in. Prereq: MICR 503. Special fee. Lab. 4 cr. (Not offered every year.)

#716. Advanced Immunology
Basic concepts in immunology, including immunorecognition, effector systems, immunogenetics, immunopathology, and comparative immunology. Prereq: gen. immunology; gen. biochemistry; permission. Special fee. Lab. 4 cr. (Not offered every year.)

751. Cell Culture
Theory and principles fundamental to culture of cells in vitro. Introduction to techniques of preparation and maintenance of animal, plant, insect, fish cell cultures. Application of cell culture to contemporary research in biological sciences. Prereq: MICR 503; permission. (Also offered as ANSC 751 and PBIO 751.) Special fee. Lab. 5 cr.

795, 796. Problems in Microbiology
Prereq: permission. 1–8 cr.

Military Science (MILT)

Reserve Officers Training Corps
(For program description, see page 90.)

Professor of Military Science: Lt. Col. Terry J. LeBouef
Adjunct Associate Professor: Col. John D. Kraus, Jr.
Assistant Professors: Capt. David B. Madden, Michael J. Madison, Capt. John R. Tierney, Capt. Christopher H. Zendt
Adjunct Assistant Professor: Capt. Kevin M. Major

413. The Defense Establishment and National Security
Elements of the U.S. defense establishment and their roles in national security. Functional interrelationships: service branches, tactical maneuver elements, major commands, operating agencies, other uniformed services, and civilian agencies. The principle of civilian control. Current world events of significance to the Army officer. Leadership laboratory required for cadets. 1 cr.

414. Military Skills I
Introduction to land navigation, expedient medical care, casualty processing, and cardiopulmonary resuscitation. Leadership lab required for cadets. 1 cr.

501. Military Skills II
Standard military map reading and use, principles of leadership, general first aid, and selected communications and technical skills development. Lab (required only of cadets). 2 cr.

502. American Military History
Development of American military institutions, civil-military relations, and use of military forces as an instrument of national policy from the Revolutionary War to the present. Empha-

sis on battle campaign analysis. Lab (required only of cadets). 2 cr.

601. Military Leadership & Management I
Introductory studies in human relations, interpersonal communications, and group interaction which relate to management and leadership application. Participative leadership and management, motivation and self-actualization. Emphasis on interrelationship between supervision, management, and leadership, and hands-on application of theory to practice. Lab. 2 cr.

602. Military Leadership & Management II
Further studies in human relations, interpersonal communication, and group interaction. Demonstrated abilities required in leadership and management. Emphasis on theory of training methods with the functions of military management and dynamic leadership. Prereq: MILT 601. Lab. 2 cr.

611. Seminar on Leadership & Management I
Examination of the military skills and professional knowledge needed for a second lieutenant. Emphasis on various Army management systems and the new lieutenant's responsibilities to the Army and to his/her superiors and subordinates. Prereq: MILT 611. Lab. 2 cr.

612. Seminar on Leadership & Management II
Examination of fundamentals of military law to develop the students' understanding of military-specific offenses and disposition procedures. Law of war and professional ethics also discussed. Lab. 2 cr.

695. Officer Internship
Experiential learning through fieldwork in a military-type unit. Written analysis required. Prereq: MILT 611 (may be taken concurrently). By permission only. May be taken up to a total of 8 credits. 1–4 cr.

Music (MUSI)

(For program description, see page 32; see also course listings under Music Education.)

Chairperson: John E. Rogers
Professors: Keith Polk, Mary H. Rasmussen, John E. Rogers, David E. Seiler
Associate Professors: Ruth S. Edwards, Robert W. Eshbach, Stanley D. Hettinger, Cleveland L. Howard, Christopher Kies, Nicholas N. Orovich, W. Niel Sir, Kathleen Wilson Spillane, Robert Stibler, Peggy A. Vagts, Larry J. Veal, Paul F. Verrette, Henry J. Wing, Jr.
Assistant Professors: Mark S. DeTurk, Peter W. Urquhart
Instructors: Michael J. Annicchiarico, Christopher Humphrey
Lecturers: Les Harris, Jr., Margaret Herlehy, John B. Hunter, Charles Jennison, Janet E. Polk, Jean M. Rife, David K. Ripley, John B. Skelton, Nancy Smith, Alexis Zaricki

History, Literature, and Appreciation

401. Introduction to Music
Fundamental approach to perceptive listening, based on a detailed study of several masterpieces representing different periods and forms. Historical perspective, but main emphasis is on confronting significant works of musical art on their own terms. Some participation in musical life of the University required. Does not fulfill a major requirement. 4 cr.

402. Survey of Music History
The study of the development of musical styles and idioms in the context of selected historical and cultural aspects of Western civilization. 4 cr.

501-502. History and Literature of Music
Styles, forms, and techniques of composition in Western music. Required of all music majors. 3 cr.

511. Survey of Music in America
From colonial times to the present, including the various European influences, the quest for an American style, and the emergence of such indigenous phenomena as jazz. 4 cr.

#513. Introduction to the Music of Africa and Asia
Folk and classical music of various ethnic cultures, particularly those of Japan, India, and sub-Saharan Africa. 4 cr.

#581. Harmony in Traditional Jazz and Popular Music
A practical course in the harmonization of popular songs and "blues." Typical chord progressions; their logic, extensions, and symbolic representations. Written exercises and instrumental improvisation. Prereq: knowledge of notation and fundamental harmony; ability to perform on a musical instrument. Some keyboard skill highly desirable. Permission. 4 cr.

595. Special Topics in Music Literature
Open to music majors and nonmajors; topics in areas not easily covered in historical courses. May be repeated for credit. Prereq: permission. 1–4 cr.

#609. Ethnicity in America: The Black Experience in the Twentieth Century
Team-taught course investigating music, literature, and social history of Black America in the period of the Harlem Renaissance, in the Great Depression, World War II, and in the 1960s. Special attention to the theme of accommodation with and rejection of dominant white culture. (Also offered as ENGL 609 and HUMA 609.) 4 cr.

#701. Music of the Medieval Period
Nature of the beginnings of polyphony. The preeminent influence of the church in the 13th century and the rising secular movement in the 14th. Music as a dominant force in the political and social life of the Middle Ages. 3 cr.

703. Music of the Renaissance
Works of the 15th- and 16th-century composers from Dunstable to Palestrina. 3 cr.

#705. Music of the Baroque
Music of Europe from de Rore to Bach. 3 cr.

707. Music of the Classical Period
Growth of musical styles and forms from early classicism through the high classicism of Haydn, Mozart, and the young Beethoven. 3 cr.

#709. Music of the Romantic Period
A survey of romanticism in music from Beethoven's late period to the end of the 19th century. The works of Schubert, Berlioz, Schumann, Mendelssohn, Chopin, Wagner, Verdi, Brahms, Austrian symphonists, French pre-impressionists, and national styles in European music. 3 cr.

711. Music of the 20th Century
Styles and techniques of composers from Debussy to the present. Special emphasis on tonal music before World War I; neoclassical trends; the emergence of atonality and serial techniques; antirationalist music; electronic music. 3 cr.

#721. The Life and Works of Beethoven
Detailed study of Beethoven, his times, and his art as exemplified by his symphonies, piano music, chamber music, sacred music, and works for the stage. 3 cr.

732. The Art Song
History and literature of the solo song with piano accompaniment. Survey of national styles of the 19th and 20th centuries and deeper study of the central core of the art song—the German Lied. 3 cr.

#733. Survey of Opera
History of the genre from Monteverdi to the present. Representative masterpieces by Handel, Mozart, Beethoven, Weber, Wagner, Verdi, Mussorgsky, Debussy, Berg, and others. 3 cr.

735. Survey of Pianoforte Literature
Keyboard literature from the Baroque to the present. Analysis, discussion, and illustration of works by Bach, Haydn, Mozart, Beethoven, the romantic composers, and contemporary writers. 3 cr.

795. Special Studies in Music
A) J. S. Bach; B) Franz Schubert; C) Debussy and Ravel; D) The World of Jazz; E) The Iconography of Western European Musical Instruments; F) 19th-Century French Music; G) Advanced Analysis; H) Advanced Study in Electronic Music; I) Composition through Computer-generated Sound; J) Woodwind Literature; K) Brass Literature; L) String Literature; M) Medieval Performance Practice; N) Renaissance Performance Practice; O) Baroque Performance Practice; P) Classical Performance Practice; Q) 19th-Century Performance Practice; R) 20th-Century Performance Practice; S) Woodwind Repair; T) String Repair; U) Advanced Jazz Improvisation; V) Advanced Piano Pedagogy; W) Advanced Accompanying; X) Advanced Conducting; Y) Independent Study. Prereq: permission. May be repeated for credit with permission. 1–4 cr.

Performance

Registration for musical laboratory courses (441-461) should be completed during the registration period. All music laboratory courses may be repeated. A maximum of 8 credits earned in music laboratory may be used toward graduation.

441. Concert Choir
A mixed chorus that studies and performs classical and modern literature. Recommended for voice majors. Open to all students. Prereq. permission. 1 cr.

442. Chamber Chorus
A mixed chorus which studies and performs sacred and secular works from the Renaissance to the present, participates with the opera workshop and with the orchestra, and serves as a nucleus for larger choral-instrumental work. Prereq: permission. 1 cr.

#443. Women's Chorus
Open to all students interested in singing the finest literature in this medium and who can fulfill the requirement of an audition. 1 cr.

448. Opera Workshop
Operatic singing, acting, and production techniques; performance of both complete operas and operatic excerpts. Prereq: permission. 1 cr.

450. Symphony
Presents several concerts during the year, of repertoire ranging from the great, standard symphonic literature to experimental, multimedia composition. Prereq: permission of conductor and audition. 1 cr.

#451. UNH Training Orchestra
Designed for music education majors but open to all who wish to develop proficiency on major or secondary instruments. Ensemble experience in the basic repertoire often met in school situations for students who do not yet meet the standards required for the UNH Symphony. 1 cr.

452. UNH Symphonic Wind Ensemble
Open to all students. Campus concerts and New England tour. Prereq: permussion and audition. 1 cr

453. Symphonic Band
Original band music, transcription, marches, etc. For students whose program does not permit music as a major interest, but who are interested in maintaining their playing proficiency and continuing their study of music. Prereq: permission. 1 cr.

454. UNH Marching Band
Open to all students, performs during home and away football games. Rehearsals conclude at the end of the football season. Prereq: permission. 1 cr Cr/F

#455. Piano Ensemble
Drawing from available student instrumentalists and singers, pianists learn the art of performing in trios, duo sonatas and two-piano works, and gain experience in Lieder accompaniment 1 cr

456. String Ensemble
457. Woodwind Ensemble
458. Brass Ensemble
459. Percussion Ensemble
460. Jazz Ensemble
In these five courses, MUSI 456 through MUSI 460, groups of instrumentalists gain experience in the performance of literature for the smaller ensemble. Prereq: permission. 1 cr.

461. Vocal Ensemble
Singers perform in small ensembles such as trios, quartets, quintets, and octets. Prereq: permission. 1 cr.

467. Functional Piano
Basic instruction for music majors with no previous keyboard training. Pianoforte technique, keyboard harmony geared to the practical harmonization of simple melodies, sightreading, transposition, and modulation. May involve both class instruction and periodic short individual lessons. Prereq: permission. 1 cr.

In courses 541 through 551 (private instruction in performance) presentation and material used vary from pupil to pupil. The emphasis is on musical values and sound technique. As the student advances, repertory is broadened to include works of all periods. One solo performance each semester may be required.

Private lessons are based on a half-hour of individual instruction per week. One semester-hour credit may be earned with one lesson per week; two or four semester hours of credit may be earned with two lessons per week (only students in the bachelor of music curriculum are allowed to register for four credits). Five one-hour practice periods are expected for each credit of private study. The special semester fee for lessons is $70 for 1 credit or $140 for 2 to 4 credits (this fee applies for courses numbered 541 through 549). The fee includes the use of a practice room for the required preparation.

Registration in courses of private instruction is open to all students in the University, subject to approval by the Department of Music and the instructor. Enrollment is limited in these courses. Students may register for credit in successive semesters.

541. Voice
1, 2, or 4 cr

542. Piano
1, 2, or 4 cr.

543. Harpsichord
1, 2, or 4 cr.

544. Organ
1, 2, or 4 cr

545. Violin, Viola
1, 2, or 4 cr.

546. Violoncello, String Bass
1, 2, or 4 cr

547. Woodwind
1, 2, or 4 cr.

548. Brass
1, 2, or 4 cr

549. Percussion
1, 2, or 4 cr.

550. Harp
(Offered by special arrangement with the department.) 1, 2, or 4 cr.

551. Early Wind Instruments
1, 2, or 4 cr.

751-752. Conducting Methods
Physical aspects, equipment of conductor, fundamental gestures and beats, baton techniques. Reading and analysis of full and condensed scores, study of transposition, psychology of rehearsal. Prereq: MUSI 571-572 and junior standing. 2 cr.

#754. Collegium Musicum
Instrumentalists and singers perform small ensemble music from all periods, with emphasis on Renaissance and Baroque music. Prereq: permission. 1 cr.

Theory and Composition

411-412. Fundamentals of Music Theory
Elements of music theory for the non-music major; principles of musical structure, analysis, elementary written counterpoint and harmony, and ear training. May not be counted for credit toward a music major. Prereq: ability to read music and permission of instructor. 4 cr.

471-472. Theory I
Introduction to the tonal system; species counterpoint; principles of voice leading and harmonic progression through the analysis, realization, and composition of one-, two-, and four-voiced textures. Concept of triad inversion and consonant diatonic harmonies of the major and minor modes. Students should register for MUSI 473-474 concurrently. Prereq: permission. 3 cr.

473-474. Ear Training I
Laboratory exercises to develop aural skills; sight-singing and dictation. Students should register for MUSI 471-472 concurrently. Prereq: permission. 1 cr.

571-572. Theory II
Continuation of MUSI 471-472. Compositional and analytic work stresses the treatment of dissonance within the tonal system; accessory tones, seventh chords, tonicization, modulation, basic principles of chromatic harmony, and harmonization of chorale melodies are covered. Students should register for MUSI 573-574 concurrently. Prereq: MUSI 472; 474. permission. 3 cr

573-574. Ear Training II
Laboratory exercises to develop aural skills further. Students should register for MUSI 571-572 concurrently. Prereq: MUSI 472; 474; permission. 1 cr.

771-#772. Counterpoint
Contrapuntal techniques of tonal music. Melodic construction and dissonance treatment through work in species counterpoint and studies in harmonic elaboration and prolongation.

Analysis of selected compositions emphasizes the connection between fundamental contrapuntal techniques and the voice-leading of composition. Prereq: MUSI 572 or permission. 2 cr.

#773. Advanced Counterpoint
Continuation of MUSI 772. Prereq: MUSI 772 or permission. 2 cr.

775-776. Composition
Construction of phrases, periods, and short compositions following classical models. Problems of text-setting. Prereq: MUSI 572 or permission. 3 cr.

777. Advanced Composition
Continuation of MUSI 776. Individual compositional projects. Prereq: MUSI 776 and permission. May be repeated for credit. 3 cr.

779. Orchestration
Characteristics of band and orchestral instruments both individually and in small (homogeneous) and large (mixed) groupings. Students study scores, write arrangements, and have arrangements performed if at all possible. Some aspects of vocal writing. Prereq: MUSI 572 or permission. 3 cr.

781, 782. Analysis: Form and Structure
Introduction to analytical techniques through the study of representative masterworks: formal and structural elements and their interrelationships. Semester I: analysis of 18th- and 19th-century works; semester II: analysis of 20th-century works. Prereq: MUSI 572 or permission. 3 cr.

785. Electronic Sound Synthesis
Analog and digital synthesizers, methods of sound synthesis (e.g., fm synthesis), MIDI programming in BASIC, control programs for synthesizers (e.g., Personal Composer). 4 cr. (Generally offered in the spring.)

Music Education (MUED)

(For program description, see page 33; for faculty listing, see page 157; see also course listings under Music.)

#500. Exploring Music Teaching
Introductory fieldwork course for students to explore music teaching as a career. Observation, teaching, research, examination of multi-mechanical aids for music curriculum development. In the MUED curriculum, this course is not required if EDUC 500 is taken with a music department professor. 2 cr. Cr/F.

540. Beginning Techniques in Voice
Basic techniques of voice production. Individual work is emphasized. Working knowledge of an instrument required. This course is desirable for, but not restricted to, MUED majors. Prereq: permission. 2 cr.

545, 546. Beginning Techniques in String Instruments
Class and individual instruction. Four hours practice per week. Training on the violin, viola, and cello. Classroom procedures, establishment of string programs, and evaluation of available methods materials. 2 cr.

595. Special Projects in Music Education
Individual investigation, research, or study. Creative projects may be included. A) Marching Band Methods and Techniques. Prereq: permission. 1–4 cr.

741-742. Techniques and Methods in Choral Music
Problems in the organization and performance of high school, college, and community choruses. Techniques of choral conducting and rehearsal, repertory, and materials. 2 cr.

743. Materials and Methods in Piano Music
Gives potential piano teachers a coherent but flexible approach to the instruction of students of different ages and levels of talent through evaluation of methods and materials and discussion of the role of the private teacher. 2 cr.

#745-746. Techniques and Methods in String Instruments
Class and individual instruction. Four hours of practice per week required. Intensive training on the violin, viola, cello, and double bass enables participants to perform in string ensembles. Classroom procedures, establishment of string programs, and evaluation of available methods materials. 2 cr.

747-#748. Techniques and Methods in Woodwind Instruments
Basic fundamentals of performance, class instruction, associated acoustical problems and study of woodwind literature. First semester: clarinet, flute, and saxophone. Second semester: double-reed instruments. 2 cr.

749. Techniques and Methods in Brass Instruments
Basic course in embouchure formation, tone, tonguing, fingering, flexibility, accuracy, and range development as applied to the trumpet or baritone horn, French horn, and trombone; methods, studies, solos, and ensembles most likely to be useful with grade school, junior high school, and high school players of brass instruments. 2 cr.

751. Techniques and Methods in Percussion Instruments
Basic performance skills on snare drum, timpani, mallet instruments, and other percussion instruments used in bands and orchestras. Materials and methods of instruction. 2 cr.

#785. Music for the Elementary Classroom Teacher
Basic skills and techniques for the nonspecialist. Correlation and integration of music in the school curriculum. 4 cr.

790. The Teaching of Elementary and Middle School Music
Experiential approach toward learning creative strategies for teaching elementary school music. Includes various curricula and methods; philosophy and psychology of music; demonstration of materials and instruments. Observation and teaching in schools. 3 cr.

791. The Teaching of Secondary School Music
Assembling, managing, and teaching junior/senior high school music curriculum. Academic issues of philosophy, curriculum building, application of learning theories, administration, evaluation, motivation, and classroom management combined with field experience in lesson planning and teaching/rehearsal techniques. Prereq: piano proficiency; MUSI 751-752. 3 cr.

792. Seminar in Music Teaching
Group discussion and demonstration of effective music teaching. On-site examinations of school music teaching. Organization and teaching of curriculum units. Normally taken during student teaching semester. 3 cr.

795. Special Studies in Music Education
Allows upper-level students to explore individually or in groups areas related to their specific professional interests. Prereq: permission. 1–4 cr.

Natural Resources (NR)

(For program description, see page 39; see also course listings under Environmental Conservation, Forestry, Soil Science, Water Resources Management, and Wildlife Management.)

Chairperson: William W. Mautz
Professors: John D. Aber, James P. Barrett, John E. Carroll, Robert A. Croker, Nicolas Engalichev, Robert D. Harter, William W. Mautz, David P. Olson, R. Marcel Reeves
Adjunct Professors: C. Anthony Federer, James W. Hornbeck, William B. Leak, Sidney A. L. Pilgrim
Associate Professors: William B. Bowden, Robert T. Eckert, Christine V. Evans, Theodore E. Howard, John A. Litvaitis, William H. McDowell, Peter J. Pekins, Barrett N. Rock, Richard R. Weyrick
Research Associate Professors: Stephen H. Jones, Frederick T. Short
Assistant Professors: Mimi L. Becker, Russell G. Congalton
Research Assistant Professor: David M. Burdick
Adjunct Assistant Professor: Jeffrey H. Gove

401. Natural Resources Perspectives
Introduction to conservation and management of living and nonliving natural resources. The economics, ethics, history, politics, and science of resource use and misuse; an overview of resource career preparation and opportunities. Selected lab/field/discussions/problem solving of forest, marine, soil, water, waste, and wildlife issues. Restricted to Department of Natural Resources freshmen. Lab. Special fee. 4 cr.

601. Race to Save the Planet
Global environmental problems facing planners, politicians, researchers, and citizens. Topics include rain forests, fossil fuel dependency, atmospheric alterations, current agricultural and industrial practices and alternatives, plant and animal diversity, waste disposal, etc. The ten 1-hour videos and weekly lecture/discussion periods are designed to provoke thought and analysis. Not offered for credit to majors within Department of Natural Resources. Students may not receive credit for EC 635 and NR 601. 3 cr.

602. Natural Resources Policy
Contemporary issues in the management and allocation of natural resources; impact of humans on agricultural and forest lands, water, wildlife, fisheries, and minerals; historical perspective of current resource policies. Restricted to Department of Natural Resources juniors and seniors. 4 cr.

653. Decision Sciences in Natural Resource Management
Application of operations research techniques and capital investment analysis to natural resource situations. Linear, goal, and dynamic programming, simulation and decision theory. Prereq: MATH 424 or 425 and FOR 643 or intermediate microeconomics. Lab. 4 cr.

702. Natural Resource Workshops
Short-term courses (generally a few days to two weeks) offered off-campus by the A) New Hampshire Audubon Society and B) Appalachian Mountain Club, as well as C) Nature Study covering a broad variety of environmental and natural resource topics. 1–4 cr. Cr/F. (May be repeated.)

711. Statistical Methods II
Intermediate course; basic concepts of sampling, linear models and analyses for one-way and multiway classification, factorial arrangement of treatments, multiple regression, and covariance. Computer programs used in analyzing data. Examples from environmental sciences. Prereq: RECO 528 or equivalent. 4 cr.

712. Sampling Techniques
Techniques of sampling finite populations in environmental sciences; choice of sampling unit and frame, estimation of sample size, confidence limits, and comparisons of sample designs. Prereq: RECO 528 or equivalent. 2–4 cr. (Not offered every year.)

713. Quantitative Ecology
Applied quantitative techniques: basic concepts in probability and statistics applied to ecological systems; population dynamics; spatial patterns; species abundance and diversity; classification and ordination; production; and energy and nutrient flow. Additional credit for in-depth mathematical analysis of a particular topic. Prereq: intro. courses in calculus, statistics, and ecology. 3 or 4 cr. (Not offered every year.)

730. Terrestrial Ecosystems
Processes controlling the energy, water, and nutrient dynamics of terrestrial ecosystems; concepts of study at the ecosystem level, controls on primary production, transportation, decomposition, herbivory; links to earth system science, acid deposition, agriculture. Prereq: FOR 527, PBIO 412 or BIOL 411, or permission. 2 cr.

757. Photo Interpretation and Photogrammetry
Practical and conceptual presentation of techniques for using remote sensing, specifically aerial photographs, in natural resources. Includes photo measures of scale, area, parallux and object heights; flight planning; photo geometry; an introduction to the electromagnetic spectrum; and photo interpretation and mapping. Concludes with an introduction to digital remote sensing including multispectral scanners, radar, and thermal imagery and a brief discussion of geographic information systems (GIS). Applications to forestry, wildlife, land-use planning, earth sciences, soils, hydrology, and engineering. Prereq: algebra. Special fee. Lab. 4 cr.

759. Digital Image Processing for Natural Resources
Introduction to digital remote sensing including multispectral scanners (Landsat and SPOT) radar and thermal imagery. Hands-on image processing including filtering, image display, ratios, classification, registration, and accuracy assessment. GIS as it applies to image processing. Discussion of practical application. Use of ERDAS image processing software. Knowledge of PCs and DOS required. Prereq: NR 757 or equivalent. Special fee. 3 cr.

760. Geographic Information Systems in Natural Resources
Introduction to the use of geographic information systems (GIS) for use with natural resources including data input, manipulation, storage, analysis, and display. Accuracy of spatial data and use of digital elevation models. Discussion of practical applications. Use of PC Arc/Info software. Prereq: permission. Special fee. 3 cr.

775. Natural Resources Senior Project
Multidisciplinary approach to land-use planning. Provides experience with dynamics of working in a group to identify, evaluate, and suggest management strategy to solve environmental problems. Class will be divided into small groups, each of which will choose or be assigned a real piece of property. Each group will act as a consulting firm in developing property management strategies. Prereq: senior standing in the Department of Natural Resources and permission. Special fee. 2 cr.

Nursing (NURS)

(For program description, see page 71.)

Chairperson: Raelene Shippee-Rice
Professor: Judith A. Sullivan
Associate Professors: Ann Kelley, Juliette D. Petillo, Dorothy D. Rentschler, Raelene Shippee-Rice, Margaret W. Spears, Rosemary Y. Wang, Carol L. Williams-Barnard
Assistant Professors: Sarah Jo Brown, Elizabeth Ely, Susan J. Fetzer-Fowler, Gene E. Harkless, Margaret A. Lamb, Kathryn R. Lynch, Judith A. Metcalf, Linda Robinson, Adele M. Spegman, Alison H. Sweatt

501. Introduction to Nursing
Examines the values and philosophy of the Department of Nursing. Explores the four domain concepts of nursing: health and how it is defined, the diverse clients served by nursing, nursing as a profession, and the complex environment within which nursing is practiced. The nature of nurse-client encounters is explored with an emphasis on teaching students the skills to interact in a caring, facilitative manner. 4 cr.

502. Concepts of Pathophysiology/ Pharmacology
Focuses on concepts of pathophysiology/pharmacology relevant to nursing practice. The physiologic response and manifestations of alterations in normal body functioning are analyzed and the effects of pharmacological agents on these alterations are examined. Prereq: ZOOL 507-508; MICR 501; majors only. 4 cr.

508. Foundations of Nursing Judgment
Focuses on the knowledge and analytical skills required to adequately assess the health status of individuals. Students learn how to collect data using an assessment framework, analyze the data, and identify client resources and problems. Emphasizes the implications of the individual's developmental status, culture, and biologic variations at all points in the assessment process. Prereq: ZOOL 507-508; NUTR 400 and 499 (or 475); NURS 501; majors only. Coreq: NURS 514. 4 cr.

514. Techniques of Clinical Nursing
Focuses on the acquisition of psychomotor and assessment skills required for the delivery of safe nursing care. Students begin by learning clinical skills in the simulation setting and then using those skills with supervision in the clinical setting. Prereq: ZOOL 507-508; majors only. Coreq: NURS 508. Lab. Special fee. 4 cr.

535. Death and Dying
Significance of death and dying examined from perspective of the individual, the family, the professional, and society. Discussion of theories of death and dying, and grief and grieving. Exploration of legal and ethical concerns. Open to all students. Prereq: permission. 4 cr.

595. Women's Health
Examines women's health and women's health care from historical, political, and social perspectives. Discussion of societal and health-care constraints that hinder women from achieving their full health potential. Also presents information on women's health-care practices, including the concept of self-care, and relates this to the development of educated consumerism in the health-care system. 4 cr.

606. Seminar on Professional Nursing
Nature and function of health care systems and role of health professionals from historical, so-

cial, political, economic, and technical viewpoints. Health and how interactions between physical and social environments affect it. Individual student examination of values, attitudes, and beliefs regarding professional role and personal goals, in relation to current nursing practice. Open to R.N. students only, by permission. 7 cr.

611. The Nurse-Client Encounter in Health Transitions
Explores the ethical and interpersonal nature of the nurse-client relationship as the client experiences situational and maturational transitions in health. Analyzes the multiple variables influencing perceptions and responses of nurse and client to transitions. Prereq: junior major. 4 cr.

614. Nursing and Social Policy
Examines critical aspects of the U.S. health care delivery system from a nursing perspective. Also examines the economic and political issues of nursing care delivery. Introduces the strategies and skills for participating in the health care planning process, including background on the influence of various power groups. Prereq: junior major. 4 cr.

615. Caring for Adults
Addresses the professional nursing practice, decision making processes, strategies and interventions as they relate to the care of adults who are experiencing chronic illnesses, acute illnesses, or impending death. The perspective adopted emphasizes the functional issues of daily living that these illnesses impose and the meanings these illnesses have for adults and their families within cultural, socioeconomical, sociopolitical, physical, and personal contexts. Prereq: junior major. Special fee. 6 cr.

618. Caring for People with Alterations in Mental Health
Provides an understanding of the concepts of mental health and major factors affecting human behavior and interaction. Uses specific theoretical concepts and psychosocial theories as a vehicle for supporting the person's and family's optimum state of well-being. Also emphasizes the practice of psychiatric nursing as being grounded on certain empirical aesthetic, personal, and ethical knowledge. Through a variety of clinical experiences, the student applies mental health concepts, principles of therapeutic communication, and the nursing process in caring for individuals and families with alterations in mental health. Prereq: junior major. Special fee. 3 cr.

620. Caring for the Childbearing and Childrearing Family
The family as focus for nursing practice. Introduces student to the care of young families throughout pregnancy, birth, and child-rearing periods. Examines healthy transitions and physical alterations occurring from conception through adolescence. Discusses the health needs of the young family in terms of major morbidity/mortality and contemporary issues. Experience in various clinical settings will provide opportunities for the development of professional practice roles. Prereq: junior major. Special fee. 6 cr.

624. Nursing in the Community
Explores the role of community health nursing in health promotion, disease prevention, and long-term care. Analyzes contemporary community health problems with implications for community health nursing. Explores a variety of clinical and population-focused roles in primary, secondary, and tertiary prevention of health problems. Special fee. Prereq: junior major. 3 cr.

625. Nursing in the Community
Explores the role of community health nursing in health promotion, disease prevention, and long-term care. Analyzes contemporary community health problems with implications for community health nursing. Explores a variety of clinical and population-focused roles in primary, secondary, and tertiary prevention of health problems. Open to R.N. students only, by permission. Prereq: NURS 606.4 cr.

636. Cardiac Arrhythmias
Theory and practice of basic single-lead arrhythmia interpretation and 12-lead electrocardiography for identifying disturbances of the cardiac rhythm. Designed to provide a firm foundation for the assessment and treatment of persons experiencing disturbances of the cardiac rhythm; includes field experiences. Prereq: ZOOL 507-508 or permission. 4 cr.

645. Nursing Research
Focuses on enhancing the student ability to evaluate, read, comprehend, participate in, and apply research to the practice of nursing. Prereq: junior major. Pre- or coreq: statistics. 2 cr.

670. Issues in Health Care of the Aged
Current concepts and issues related to study of aging from biological and sociological perspectives. Multidisciplinary study of issues relevant to the development of social policies affecting health care and delivery of services to the elderly. Course divided into two parts: (1) study of the normal physiological and psychological processes of aging, and (2) impact of social, cultural, and economic forces on care of the elderly and delivery of health services. Open to all students. 4 cr.

690. Community Nursing Guided Study
Enables R.N. students to fulfill the terminal objectives of the nursing major that are not earned through NURS 625. Prereq: NURS 606. 3 cr. Cr/F.

694. Special Topics
Specialized courses covering information not normally presented in regular course offerings. Description of topics varies. May be repeated but not duplicate areas of content. Prereq: permission. 1–4 cr. (Not offered every year.)

695. Independent Study
In-depth study with faculty supervision. Prereq: junior standing and approval of adviser and faculty of the area concerned. May be repeated for different topics. 2–4 cr.

703. Nursing Leadership/Management and the Organizational Context
Focuses on understanding ways in which the nurse can affect the organizations in which practice occurs and ways in which the organizations affect the individual's practice. Emphasizes issues of leadership; management; power; change; motivation; and interfacing of autonomous, dependent, and interdependent nursing functions in current and future health care delivery systems. Prereq: junior major. 4 cr.

719. Professional Nursing Practice: Transitions
Provides opportunity for student to refine and integrate previously learned knowledge and skills into professional practice through a cooperatively designed learning experience/environment. Open to R.N. students only, by permission. Prereq: NURS 606. 7 cr.

720. Professional Nursing Practice: Transitions
Provides opportunity for student to refine and integrate previously learned knowledge and skills into professional practice through a cooperatively designed learning experience/environment. Final course in major. Special fee. 8 cr.

794. Special Topics
Specialized courses covering information not normally presented in regular course offerings. Description of topics varies. May be repeated but not duplicate areas of content. Prereq: permission. 1–4 cr.

796. Assessment and Intervention of Addictive Behaviors
Concepts related to addictions seen in common disorders such as alcoholism, drug abuse, eating disorders, and codependency. Addresses assessment treatment, and relapse prevention. Generic concepts are expanded through specific areas of addiction. Seminar format to facilitate class participation. Prereq: junior, senior, or graduate standing. 4 cr. (Also offered as OT 796.)

797. Honors Project
Honors seminar designed to expand the knowledge and skills presented in previous honors in major courses. Focus of course is a project relevant to the discipline of nursing under the direction of a faculty adviser. Pre- or coreq: NURS 645; permission. 4 cr.

Nutritional Sciences (NUTR)

Department of Animal and Nutritional Sciences
(For program description, see page 48. For other courses, see listings under Animal Sciences, page 101.)

Professors: James B. Holter, Samuel C. Smith
Associate Professors: Joanne Curran-Celentano, Colette H. Janson-Sand, Charles G. Schwab, Anthony R. Tagliaferro
Assistant Professors: Dennis J. Bobilya, Gale B. Carey
Teacher/Trainer: Caroline Giles
Extension Educators: Valerie A. Long, Catherine A. Violette

400. Introduction to Nutrition
Introduction to nutrition and food science. Coreq: NUTR 499. (Credit cannot be received for both NUTR 400 and ANSC 400.) 3 cr.

401. Introduction to the Dietetics Profession
Survey of the role and responsibilities of the dietitian. Legal and ethical considerations necessary for the student dietitian in clinical experiences. Educational and personal qualifications for specialization in dietetics. Prereq: NUTR major. 1 cr. Cr/F. (Fall semester only.)

#405. Food and Society
Consideration of the cultural significance of food, emphasizing historical, psychological, social, political, and economic aspects. (Also offered as ANSC 405.) 4 cr.

476. Nutritional Assessment
Experimental techniques in anthropometric and biochemical assessment of nutritional status with emphasis on client interviewing and nutritional evaluation in a community setting. Prereq: NUTR 400 and 499 or permission. Special fee. 3 cr. (Spring semester only.)

478. Food Fundamentals
Principles and techniques of food selection, preparation, and preservation in relation to quality and acceptability. 3 cr. (Spring semester only.)

499. Introduction to Clinical Nutrition
Practical applications of nutrition as a therapeutic tool in health promotion disease prevention with a focus on clinical applications. Coreq: NUTR 400. Special fee. 2 cr.

503. Principles of Institutional Food Service Management I
Practical experience in methods of purchasing, and handling food, tools, and equipment used in quantity food preparation; lab experience in selective settings. May be taken independently of NUTR 504. Prereq: NUTR 478 or permission of instructor. 3 cr. (Fall semester only.)

504. Principles of Institutional Food Service Management II
Emphasizes the basic principles of managing food service operations, including personnel management, in-service and on-the-job training, policies and procedures development, and financial management. May be taken independently of NUTR 503. 3 cr. (Spring semester only.)

509. Nutrition Counseling
Emphasis on basic principles of counseling and practical skills necessary to perform as effective nutrition counselors in a clinical or health-care environment Prereq: NUTR 400, 476, 499; /or permission. 2 cr. (Fall semester only.)

511. Nutrition Education: Methods and Materials
Principles, methods, and materials involved in nutrition education. Emphasis on development of educational materials for clinical and community programs. Prereq: NUTR 400 and 499 2 cr. (Fall semester only.)

550. Food Science: Principle and Practice
Principles of food composition structure and properties and the chemical changes foods undergo in preparation and processing. Study of the laws and regulations that are applied to marketing food systems; principle and practice in food preservation. Application of scientific principles and interpretations of laboratory findings. Prereq: NUTR 400, 478, and 499; CHEM 403-404; CHEM 545-546. Special fee. Lab. 4 cr. (Spring semester only.)

600. Field Experience in Nutrition
Supervised field experience in public and private agencies with planned learning objectives related to the areas of clinical and community nutrition and food service management. Students are responsible for their own transportation; faculty member coordinates arrangements with fieldwork sites. Prereq: NUTR majors and minors only; permission; NUTR 400 and 499. 1–4 cr. Cr/F. (May be repeated for a maximum of 6 cr.)

620. Principles of Community Nutrition
Study of community agencies and programs providing for differing age groups. Emphasis on assessment of nutritional needs of the community. Prereq: NUTR 400 and 499. 3 cr. (Spring semester only.)

646. Sports Nutrition
In-depth look at the facts and fallacies of sports nutrition for students who plan to become health professionals. Topics include protein needs for athletes, fat as fuel, carbohydrates and athletic performance, nutrition ergogenic aids, vitamin and mineral needs of athletes, fluid replacement, eating disorders, and proper training diets. Prereq: NUTR 400 and 499 or ANSC 400; PHED 620 or ZOOL 507-508. 4 cr.

650. Life Cycle Nutrition
Detailed analysis of nutrient requirements throughout the life cycle. Nutrient needs are evaluated in the context of their metabolic functions. Prereq: NUTR 400 and 499. 3 cr. (Spring semester only.)

699. Independent Study
Scholarly project in an area of the nutritional sciences under the guidance of a faculty adviser. Prereq: permission. 1–4 cr.

720. Public Health Nutrition
Focus on managerial processes of planning, leading, and evaluating nutrition programs and the skills and tools needed to develop and present such programs. (Also offered as ANSC 720.) 4 cr.

730. Dietetics Practicum I—Foodservice Management and Community Nutrition
Supervised practical experience in the professional areas of food service management and community nutrition integrated with classroom theory and lectures. Prereq: ADA Plan IV/V verification and acceptance into the NACS AP-4 Program. 4 cr. IA.

731. Dietetics Practicum II—Clinical Nutrition
Supervised practical experience in the professional areas of dietetics and clinical nutrition integrated with classroom theory and lectures. Prereq: ADA Plan IV/V verification and acceptance into the NACS AP-4 Program. 2 cr. IA.

750. Nutritional Biochemistry
Detailed analysis of the digestion, absorption, transport, and intermediary metabolism of nutrients. Nutrient requirements are evaluated in the context of their physiological and biochemical functions. Prereq: ZOOL 507-508; BCHM 658; or equivalents. (Also offered as ANSC 750.) Special fee. 4 cr.

755. Disorders in Energy Balance
Etiology, pathophysiology, and treatment of obesity, anorexia nervosa, and bulimia. Role of hereditary, neurological, metabolic, and environmental mechanisms. Particular emphasis on obesity. Prereq: permission of instructor. 4 cr.

756. Principles and Practices of Obesity Management
Emphasis on the necessary professional assessment tools, techniques, and strategies for comprehensive weight loss and weight management. Prereq: NUTR 400; 476; 499; permission. 2 cr. (Summer session only.)

#760. Geriatric Nutrition
Emphasis on the nutritional requirements and status of the elderly in view of psychological and physiological changes in aging. Approaches for nutrition intervention and support will be addressed. Prereq: NUTR 400 and 499 or permission. (Also offered as ANSC 760.) 3 cr. (Summer session only.)

773. Clinical Nutrition
Application of principles of normal nutrition and physiology to clinical problems; altered nutrient requirements in human disease. Prereq: basic nutrition and biochemistry or permission. Coreq: NUTR 775. (Also offered as ANSC 773.) 4 cr. (Fall semester only.)

775. Practical Applications in Therapeutic Nutrition
Supervised practical experience in therapeutic dietetics in one of several cooperating New Hampshire hospitals. Emphasis on nutritional counseling, assessment, and instruction of patients with nutrition-related disorders. Coreq: NUTR 773. (Also offered as ANSC 775.) 3 cr. (Fall semester only.)

780. Critical Issues in Nutrition
Critical review and analysis of controversial topics in nutrition; emphasis on developing oral and written communication skills and analytical reasoning skills. Prereq: permission. (Also offered as ANSC 780.) 4 cr. (Spring semester only.)

795. Honors Thesis
A special project conducted under faculty supervision and resulting in a written honors thesis. Students must initiate discussion of the project with an appropriate faculty member. Prereq: senior major with cumulative G.P.A. of 3.50 (3.67 in major); permission. 4 cr.

Occupational Therapy (OT)

(For program description, see page 72.)

Chairperson: Elizabeth L. Crepeau
Associate Professors: Elizabeth L. Crepeau, Alice Crow-Seidel, Ruth Smith, Barbara Sussenberger, Ann D. Ury, Judith D. Ward
Assistant Professors: Lou Ann Griswold, Maureen E. Neistadt, Mary M. Slattery

The following courses are for occupational therapy students; elective for others by permission of the course instructor.

410. Introduction to Occupational Therapy
Concepts and historical perspective of the basic theories and techniques. Fundamentals of evaluation, testing, and problem solving; planning and administering treatment. Prereq: OT major or permission. 4 cr.

441. Level I Fieldwork—Introduction
Designed to provide first-year OT students the opportunity to experience OT in a clinical setting. Lecture format, followed by one-week clinical placement, followed by two processing sessions. Faculty member coordinates fieldwork sites; students are responsible for transportation and housing; yearly professional liability insurance fee charged. Prereq: majors only. 1 cr.

500. The Behavior and Development of Children
Introduction to the biological, psychosocial, and cultural aspects of human development from birth through adolescence. Emphasis on theories that help explain human behavior; discussion of implications of developmental research. 4 cr.

501. Developmental Tasks of Adulthood
Includes the biological and psychosocial context of development. Developmental tasks as they relate to the accomplishment of prior tasks, physiological change, socioeconomic status, and psychosocial development. Prereq: child development course or permission. 4 cr.

511. Introduction to Professional Literature and Communication
Literature related to the practice of occupational therapy and the communication skills required of therapists. Emphasis on research in professional literature, scholarly writing, and professional terminology. Introduction to oral reporting, clinical observation, and documentation techniques. Special fee. Prereq: sophomore OT major. 4 cr.

514. The Meaning of Human Occupation
A major assumption of occupational therapy, the importance of activity or occupation in sustaining health, provides the framework for the course. The meaning of occupation to individuals, major theories of occupation, and methods of assessing an individual's self-care, work, and leisure activities. Laboratory experiences enable the students to acquire skills in elected activity or occupation. Special fee. Prereq: OT 410. 4 cr.

516. Introduction to Human Occupation
The importance of activity or occupation to sustain health provides the framework of this course. The meaning of occupation to individuals, major theories of occupation, and methods of assessing an individual's self-care, work, and leisure activities. 2 cr.

581. Concepts of Medicine and Health for Occupational Therapists
Models of health and medicine are used to determine the impact of selected diseases and disabilities on human function and occupational behavior. Students learn various approaches to studying disease or chronic disability processes. Prereq: ZOOL 507-508 or permission. 4 cr.

641. Level I Fieldwork—Observation and Interpretation
Designed to provide second- and third-year OT students a more in-depth exposure to OT in a clinical setting. Lecture format, followed by one-week clinical placement, followed by two processing sessions. Faculty member coordinates fieldwork sites; students are responsible for transportation and housing; yearly professional liability insurance fee charged. Prereq: sophomore/junior majors only; OT 441. 1 cr.

682A. Rehabilitation Principles for Occupational Therapists
Principles and techniques used by occupational therapists in rehabilitation of clients with physical disabilities. Labs provide practice in techniques. Prereq: OT majors only; PHED 652, 653A; OT 410, 514, 581. Lab. 3 cr.

682B. Rehabilitation of the Upper Extremity
Principles and techniques used by occupational therapists in rehabilitation of clients with upper extremity and hand dysfunction. Lab provides experience in muscle testing, range of motion assessment, and splinting. Prereq: PHED 652, 653A; OT 410, 514, 581; OT majors only. Lab. Special fee. 1 cr.

683. Occupational Therapy: Psychiatric Foundations
Clinical psychiatric conditions presented through lecture and observations. Recognition of psychiatric symptoms, their cause, and general treatment are emphasized. Prereq: PSYC 401 or permission. Special fee. 4 cr.

694. Neurodevelopmental Evaluation and Treatment
Processes involved in treatment of neurodevelopmental disabilities. With thorough understanding of normal child development as base, therapist learns to differentiate among behaviors and functional styles of clients that may be considered appropriate and anticipated, delayed, or pathological. Knowledge of unique characteristics of specific disabilities and choice of appropriate assessment tools and course of therapeutic intervention. Prereq: PHED 706; child development. Lab. 4 cr.

695. Independent Study
In-depth study with faculty supervision. Prereq: junior standing in OT major; approval of major adviser and faculty of area concerned. 2–4 cr. Cr/F. (May be repeated for a maximum of 8 cr.)

723. Group Process
Theories of group development and models of group treatment. Comparison of normal and therapeutic groups. Group process in practice; role development and leadership concepts. Prereq: OT 683 or permission. Special fee. 2 cr.

725. Occupational Therapy Treatment of Psychosocial Dysfunction
Current frames of reference for occupational therapy practice in psychiatric/mental health settings. Focuses on client evaluation and treatment methods as well as an overview of program development approaches in mental health systems. Prereq: OT 723; OT 683. Lab. 4 cr.

733. Treatment in Adult Neurodysfunction
Presents diseases of the adult central nervous system. Includes beginning skills in evaluation, setting of measurable treatment objectives, and selection of treatment techniques and activities for this population. Prereq: PHED 652, 653A, 706; OT 682, 694. Lab. 4 cr.

734. Systems of Therapeutic Intervention in Physical Disabilities
Case observation and presentation of methods of delivery and factors related to delivery of occupational therapy services. Development of treatment plans for clients with physical disabilities. Prereq: PHED 652, 653A, 706; OT 694, 733. Special fee. 4 cr.

774. Occupational Therapy in School Systems
Current issues of practice in school systems. Explores unique features of occupational therapy in schools, interrelationships among educational personnel, and unique skills necessary for effective service delivery. Prereq: OT 694. 1 cr.

786. Management of Occupational Therapy Services
Organization and administration theory applied to the field of practice. Knowledge and abilities necessary to assume administrative responsibilities for services that reflect the standards and ethics of the profession. Prereq: OT 733 or permission. 2 cr.

788. Transitions: Student to Professional
Exploration of role changes involved in leaving the academic world and entering the realm of professional and clinical settings. Role delineation, effective communication, supervisor/supervisee relationship, and career planning are addressed. Prereq: OT 733 or permission. 2 cr.

791. Senior Honors Thesis
Completion of a research proposal based on a topic of relevance to the occupational therapy profession. Development of knowledge and skills in receiving and critiquing research and professional literature; research design and methodology; and the development of a research proposal. Required for graduation with honors in the major. 4 cr.

795. Special Topics
Explores areas related to occupational therapy theory, practice, and/or research. May repeat to 12 credits but not duplicate subject areas. Prereq: permission. 2–4 cr.

796. Assessment and Intervention of Addictive Behaviors
Concepts related to addictions seen in common disorders such as alcoholism, drug abuse, eating disorders, and codependency. Addresses assessment, treatment, and relapse prevention. Generic concepts are expanded through specific areas of addiction. Seminar format to facilitate class participation. Prereq: junior, senior, or graduate standing. 4 cr. (Also offered as NURS 796.)

797. Psychosocial Dysfunction Fieldwork
Supervised field experience in off-campus setting for three-month period. Prereq: completion of senior year OT requirements or permission. Must be completed successfully to qualify to take professional certification exam. This is a multi-term course; an IA grade will be given at the end of the first semester. Special fee. 0 cr.

798. Physical Dysfunction Fieldwork
Supervised field experience in off-campus setting for three-month period. Prereq: completion of senior year OT requirements or permission. Must be completed successfully to qualify to take professional certification exam. This is a multi-term course; an IA grade will be given at the end of the first semester. Special fee. 0 cr.

799. Special Area Fieldwork
Supervised field experience in off-campus setting for three-month period. Prereq: completion of senior year OT requirements or permission. Must be completed successfully to qualify to take professional certification exam. This is a multi-term course; an IA grade will be given at the end of the first semester. Special fee. 0 cr.

799A. Continuing Fieldwork
Students who have previously registered for OT 797, 798, or 799 and have not completed their fieldwork must register for OT 799A. Prereq: permission. 0 cr. Cr/F. IA.

Ocean Engineering (OE)

(For program description, see page 84.)

710. Ocean Measurements Lab
Measurements of fundamental ocean processes and parameters. Emphasis on understanding typical offshore measurements, their applications, and the use of the acquired data, in terms of the effects on structures and processes in the ocean. 4 cr.

751. Naval Architecture in Ocean Engineering
Selected topics in the fundamentals of naval architecture pertinent to ocean engineering, including hydrostatic characteristics, basics of resistance and propulsion, and rules and regulations for surface, semisubmersible, and submersible marine vehicles. Computer applications. Prereq: ME 608; ME 525;/or permission. (Also offered as ME 751.) 4 cr.

752. Submersible Vehicle Systems Design
Conceptual and preliminary design of submersible vehicle systems; submersibles, environmental factors, hydromechanic and structural principles, materials, intra/extravehicle systems, operating considerations, predesign and design procedures. Design projects selected and completed by student teams. Prereq: permission. (Also offered as ME 752.) 4 cr.

#753. Ocean Hydrodynamics
Fundamental concepts of fluid mechanics as applied to the ocean; continuity; Euler and Navier-Stokes equations; Bernoulli equation; stream function, potential function; momentum theorem; turbulence and boundary layers are developed with ocean applications. Prereq: permission. 3 cr.

754. Ocean Waves and Tides
Introduction to waves: small amplitude, linear wave theory, standing and propagating waves, transformation in shallow water, energy and forces on structures, generation by wind and specification of a random sea, long waves with rotation, and internal waves. Introduction to tides: description of tides in ocean tidal generation forces, equilibrium tide, and tidal analysis. Lab/project: field and lab measurements with computer analysis. Prereq: PHYS 407-408; MATH 527;/or permission. (Also offered as EOS 754.) Lab. 4 cr.

#757. Coastal Engineering and Processes
Introduction to small amplitude and finite amplitude wave theories. Wave forecasting by significant wave method and wave spectrum method. Coastal processes and shoreline protection. Wave forces and wave structure interaction. Introduction to mathematical and physical modeling. (Also offered as CIE 757; ME 757.) Prereq: fluid dynamics or permission. 3 cr.

#761. Materials in the Ocean
Introduction to mechanical properties of materials; ferrous metals; non-ferrous metals; concrete, plastic, wood, etc.; corrosion of metals; corrosion control; durability of cementitious materials; degradation of plastics, wood, etc., in marine environment; proper materials selection for a marine environment. Prereq: permission. 3 cr.

#781. Physical Instrumentation
Analysis and design of instrumentation systems. Sensors, circuits, and devices for measurement and control. Elements of probability and statistics as applied to instrument design and data analysis. Transmission, display, storage, and processing of information. The design implementation, testing, and evaluation of a relevant instrument system is an integral part of the course. Prereq: senior standing in EE or equivalent; EE 652; and permission. Lab. 4 cr.

785. Underwater Acoustics
Vibrations, propagation, reflection, scattering, reverberation, attenuation, sonar systems, ray and mode theory, transducers and arrays, signal analysis. Prereq: permission. 4 cr.

#795. Special Topics in Ocean Engineering
New or specialized courses and/or independent study. May be repeated for credit. 2–4 cr.

Oceanography

(For program description, see page 84.)

Philosophy (PHIL)

(For program description, see page 34.)

Chairperson: Yutaka Yamamoto
Professors: Paul T. Brockelman, Robert C. Scharff, Duane H. Whittier
Associate Professors: Andrew Christie, Willem A. deVries, R. Valentine Dusek, Neil B. Lubow, Barbara S. Tovey, Timm A. Triplett, Charlotte Elizabeth Witt, Yutaka Yamamoto
Assistant Professors: Paul McNamara, Kenneth R. Westphal
Lecturers: Jennifer Armstrong, Thomas P. Sullivan

Introduction to Philosophy: The 400-level courses (except 495) listed below are all introductions to philosophy; students should select among them according to interest. See course descriptions posted in department for detailed information on course offerings.

401. General Introduction to Philosophy
Depending upon the instructor, the emphasis will be on basic philosophic problems, recurrent types of philosophies, or selected readings from the history of philosophy. 4 cr.

412. Beginning Logic
Principles of reasoning and development of symbolic techniques for evaluating deductive and inductive arguments. 4 cr.

417. Philosophical Reflections on Religion
Introductory philosophy of religion. To help students become critically aware of philosophical issues involved in various forms of religious belief and some of the persisting philosophical understandings of those issues. 4 cr.

421. Philosophy and the Arts
Contemporary philosophic concerns and perspectives as reflected in one or more of the arts (literature, theatre, film, music, plastic art). 4 cr.

424. Science, Technology, and Society
Consideration of the scientific endeavor and its social import from a philosophical perspective. 4 cr.

430. Society and Morals
Critical study of principles and arguments advanced in discussion of current moral and social issues. Possible topics: violence, rules of warfare, sexual morality, human rights, punishment, abortion. 4 cr.

435. The Human Animal
Philosophy of biology and the evolutionary process. Readings of scientists and philosophers' commentary on scientists. Examination of the

differences between scientific debate and philosophic debate. Philosophical study of scientific theory stressing humans' place in the natural world and the ethical implication of humans as natural beings in the evolutionary process. 4 cr.

436. Social and Political Philosophy
Important concepts in social and political philosophy such as natural rights, revolution, law, freedom, justice. Variable content. 4 cr.

447. Computer Power and Human Reason
The historical origins of the science of computation. The implications of the nature of information-processing for understanding the mind-body relation. Examination of the possible social, economic, and educational consequences of the computer revolution. 4 cr.

450. Ecology and Values
Focus on historical and contemporary philosophies of nature and their effects on human interaction with the environment. Issues include obligations to future generations and to animals, plants, and ecosystems; moral limits on consumption and reproduction; and the existence of objects of intrinsic value. Specific topics may include species loss and biological diversity, population growth, changes in the atmosphere, energy use, and sustainable development. 4 cr.

495. Tutorial Reading
Basic introductory reading under faculty direction on topics of philosophical importance. Books offered for tutorial reading may be in any area the instructor chooses or on independent study basis. Prereq: permission. Variable to 4 cr.

496. Philosophic Topics
Introductory-level seminar in specific topics or problems (e.g., death, love, friendship) considered from a philosophic point of view. 4 cr.

For special introductory courses in the area of applied philosophy, see Fundamentals of Applied Philosophy, page 167.

500. Philosophy Workshop
Introduction to methods of studying philosophical texts. Emphasis on reading philosophical texts and arguments for comprehension, and on writing philosophically with accuracy and clarity. Open to PHIL majors only (PHIL minors may enroll if they receive special permission). 4 cr.

#510. Philosophy and Feminism
Focus on the philosophical issues in feminism primarily through the work of historical and contemporary philosophers. Topics include the question of the nature of women, feminism as an ethical and political theory, feminism as an exploration and transformation of the self, feminism as a philosophical methodology, the institutions of marriage and motherhood. 4 cr.

520. Introduction to Eastern Philosophy
Major Eastern traditions of philosophy. Concentration on Indian, Chinese, and Japanese systems may vary from semester to semester. 4 cr.

530. Moral Philosophy
Critical examination of the development of philosophical thinking regarding human values, rights, and duties. 4 cr.

550. Symbolic Logic
Principles and techniques of modern logic. Topics: propositional logic, truth tables, predicate logic, and, time permitting, basic metatheorems. Prereq: PHIL 412. 4 cr.

570. Ancient Philosophy
Development of Western philosophy from its beginnings in Greece to the Roman period, with particular emphasis on the thought of Plato and Aristotle. 4 cr.

571. Medieval Philosophy
Philosophical thought of the Middle Ages from inception in the late Roman period with thinkers such as Plotinus and Augustine through the late medieval speculative mysticism of such figures as Meister Eckhart. Writings of Augustine and Thomas Aquinas. 4 cr.

574. 17th-Century Philosophy
Important works of the 17th century, the birth of modern philosophy. Selections may be drawn from the works of Galileo, Descartes, Hobbes, Malebranche, Gassendi, Boyle, Spinoza, Locke, Leibniz, Berkeley, and others. 4 cr.

575. 18th-Century Philosophy
Important works of 18th-century philosophy, especially those of Immanuel Kant. Selections may be drawn from the works of Leibniz, Berkeley, Hume, Wolff, Condillac, Rousseau, Reid, Kant, and others. Prereq: PHIL 574 or permission. 4 cr.

#577. 19th-Century Philosophy
Philosophical movements such as later German idealism, French positivism, utilitarianism, pragmatism, Marxism, existentialism, and vitalism. Prereq: PHIL 574 or 575;/or permission. 4 cr.

600. Philosophy through Literature
Philosophical implications of representative literary works; content variable. 4 cr.

618. Recent Anglo-American Philosophy
Philosophical movements such as analytic philosophy, pragmatism, and process philosophy. Typical readings: Russell, Wittgenstein, James, Dewey, Whitehead. Prereq: two courses in history of philosophy (one of which may be concurrent);/or permission. 4 cr.

620. Recent European Philosophy
Major developments and themes. Representative figures: Jaspers, Husserl, Heidegger, Bloch, Lukacs, Habermas, Bergson, Marcel, Sartre, Merleau-Ponty, Ricoeur, Kolakowski, etc. Prereq: two courses in history of philosophy (one of which may be concurrent);/or permission. 4 cr.

#630. Philosophy of the Natural Sciences
Philosophical problems raised by the physical and biological sciences; role of mathematics in science, nature of scientific concepts of space and time, relations of science to common sense, relation of theory to observation, logic of scientific discovery, nature of historical changes in scientific world-view, relation of logic of science to the psychology, and history of science. 4 cr.

635. Philosophy of Law
Systematic study of salient features of legal systems. Possible topics: nature of law; concept of legal validity; law and morality; individual liberty and the law; legal punishment; legal responsibility and related concepts (for example, legal cause, harm, mens rea, negligence, strict liability, legal insanity). 4 cr.

650. Logic: Scope and Limits
Close examination of the scope and limits of formal systems. Variable content: consistency and completeness of predicate logic; Godel's proof and the formalization of mathematics; modal and deontic logic; set theory; finite automata and computing machines; and formal semantics. Prereq: PHIL 550; MATH 531;/equivalents or permission. 4 cr.

699. Senior Thesis
Tutorial work for philosophy department candidates for "Commendation" and "Honors." Prereq: two courses in history of philosophy, senior standing, and permission. 4 cr. Cr/F.

701. Topics in Value Theory
Philosophical inquiry into the nature of value. Topics may include the grounds of right and wrong, various conceptions of morality, the nature of good and evil, theories about the meaning of life, the nature of the beautiful. Prereq: permission. 4 cr.

702. Topics in Metaphysics and Epistemology
Advanced study in one or more of the following topics: nature of reality, relationship of thought and reality, nature of knowledge and perception, theories of truth. Prereq: two courses in history of philosophy;/or permission. 4 cr.

710. Philosophy of Religion
Philosophic nature and significance of religious experience; historical and systematic analysis of such traditional issues as the nature of faith, relation of faith to reason, arguments concerning the existence and nature of God, the problem of evil, the relationship of religion and morality, and the relationship of religion and science. Prereq: two courses in history of philosophy;/or permission. 4 cr.

720. Philosophical Psychology
Philosophical perspectives and problems concerning human nature or the human condition; e.g., the nature of "self," human action, the body-mind problem, freedom of the will, the meaning of "person," the nature of behavior, etc. Prereq: two courses in history of philosophy;/or permission. 4 cr.

#725. Philosophy of the Social Sciences
Nature of explanation and understanding in the social sciences. Similarities and differences between the social and physical sciences; claims of objectivity and of subjectivity in the social sciences; role of values in the social sciences. Prereq: two courses in history of philosophy;/or permission. 4 cr.

735. Major Figures in Philosophy
Content variable. In-depth examination of a major figure (e.g., Aristotle, Kant, Heidegger) or movement (logical positivism, phenomenology, feminism, etc.). 4 cr.

745. Philosophy of Language
Contemporary philosophical studies of the nature of meaning and structure of language. Prereq: two courses in history of philosophy;/or permission. 4 cr.

750. Philosophy of History
Nature of historical knowledge, efforts to discover patterns of meaning in the past. Prereq: two courses in history of philosophy;/or permission. 4 cr.

#780. Special Topics in Philosophy
Advanced study of special topics: a problem, figure, or movement in the history of philosophy; or selected issues, thinkers, or developments in contemporary philosophy. Prereq: two courses in history of philosophy;/or permission. 4 cr.

795, 796. Independent Study
For students who are adequately prepared to do independent, advanced philosophical work; extensive reading and writing. Before registering, student must formulate a project and secure the consent of a department member who will supervise the work. Conferences and/or written work as required by the supervisor. 1–4 cr.

798-799. Honors Thesis
Open only to philosophy majors in the University Honors Program. Students writing an honors thesis must take both of these courses, in consecutive semesters, under the supervision of two faculty advisers. Students are required to give an oral defense of their thesis. Prereq. for 799: satisfactory grade on written work in 798. 4 cr.

Fundamentals of Applied Philosophy

The following are introductory courses on the fundamentals of philosophy in practice. Special emphasis is placed on identifying and reflecting on philosophical issues that arise in the context of one's professional as well as everyday life. They are designed to interest those who wish to examine the broader philosophical implications of their chosen professional activity and also those who share the awareness that, in today's world, a systematic value-orientation must complement one's scientific knowledge and skills.

447. Computer Power and Human Reason
(For course description, see page 165.)

660. Law, Medicine, and Morals
Critical examination of the diverse legal and moral issues facing the profession of health care. Variable topics. Possible topics: duty to provide care; nature of informed consent to treatment; problems of allocating limited health-care resources (e.g., withdrawal of life-support systems, quality-of-life decisions, etc.); patient's right to confidentiality; problems relating to involuntary preventive care (e.g., involuntary sterilization, psycho-surgery, etc.). 4 cr.

#683. Technology: Philosophical and Ethical Issues
The bases of modern technology in, and its impact upon, people's philosophic conceptions of themselves and their world. Ethical, social, political, and ecological implications of technology. Risk and benefit criteria. Technological and humanistic philosophies of life. 4 cr.

Physical Education (PHED)

(For program description, see page 73.)

Chairperson: Michael A. Gass
Professor: Robert Kertzer
Associate Professors: Ronald C. Croce, Michael A. Gass, Stephen H. Hardy, Neil B. Vroman, Walter E. Weiland
Assistant Professors: Heather Barber, Thomas R. Barstow, Toni Bruce, Frances E. Cleland, John P. Miller, Timothy J. Quinn, Daniel R. Sedory, Scott D. Wurdinger
Instructors: Kenneth T. Hult, David W. Lockett
Adjunct Instructor: Pamela McPhee

Adjunct faculty from the Departments of Intercollegiate Athletics

Adjunct Lecturers: James H. Boulanger, M. William Bowes, James H. Urquhart

The Major Program

Prospective physical education majors should refer to page 77 for information regarding the major programs.

Program Fees

Fees are charged for off-campus activities such as backpacking, canoeing, ice climbing, rock climbing, and for courses that use special equipment. Students with physical limitations are encouraged to participate in the program on a modified basis. PHED 410–457 may be repeated once for credit. For specific course requirements, prerequisites, and fees, consult Tom Barstow, assistant chair.

410. Cardiopulmonary Resuscitation
Appropriate actions for survival from cardiac arrest and foreign body airway obstruction. Recognition of the early warning signs of cardiovascular disease. Leads to certification by the American Heart Association. Special fee. .5 cr. Cr/F.

Half-Semester Courses (.5 credits each)
413. Bicycling
432. Ski Touring—Intermediate
462. Basic Canoeing

Half-Semester Courses (1 credit each, unless otherwise noted)
465. Basic Ice Climbing

Full-Semester Courses (1 credit each)
447. Lifeguard Training
452. Weight Training
454. Special Topic
457. Aerobic Activities

Theory Courses

500. Historical and Contemporary Issues in Physical Education
Topics include relationship to medicine, social reform, and education; growth of the profession and its linkage to cognate fields of knowledge; current legal, ethical, and political issues in exercise, sport, and physical training. Open to PHED students in pedagogy option, undeclared HHS students, undeclared liberal arts students. 4 cr.

501. First Aid—Responding to Emergencies
Covers the nationally accredited American National Red Cross First Aid—Responding to Emergencies and BLS-CPR professional rescuer course. (May not repeat for credit.) 2 cr. Cr/F.

502. Basic Athletic Training
Introductory course on techniques for prevention, recognition, treatment, and rehabilitation of common athletic injuries. Course is a pre- or corequisite for beginning clinical experience in athletic training rooms. Lab. Pre- or coreq: ZOOL 507. Coreq: PHED 503A or 503B, Basic Athletic Training Lab. 3 cr.

503A. Basic Athletic Training Lab
Theory and techniques of protective taping and wrapping to prevent common athletic injuries. Coreq: PHED 502. Only for students not seeking entry in the athletic training option. Special fee. 1 cr. Cr/F.

503B. Basic Athletic Training Lab
Theory and techniques of protective taping and wrapping to prevent common athletic injuries. Techniques of transfer and transportation of injured athletes. Identification of anatomical landmarks. Observation and practice in the University training rooms. Coreq: PHED 502. Required for full-time admission into the athletic training option. Special fee. 1 cr. Cr/F.

504. Measurement and Evaluation in Physical Education
Introductory elements essential to the use of measurement and evaluation as an integral part of physical education's instructional process. Use of descriptive statistics and test administration and selection for the purposes of assigning grades and justifying program effectiveness. 4 cr.

505. Activity Assisting
Student assists in the conduct of an activity course under the direct supervision of the course instructor and receives same number of credits as that of the activity course. Prereq: sophomore standing. 0.5–2.0 cr. (maximum: 4 cr.) Cr/F. (May repeat once for credit with a different activity course.)

#520. Water Safety Instructor Course
Analysis of aquatic techniques; methods of teaching swimming, diving, and lifesaving. A.R.C. instructor certification awarded to candidates with high caliber of personal skill, knowledge, and teaching ability. Course will include A.R.C. Emergency Water Safety. 2 cr.

#521. Theory of Coaching Basketball
Individual and team offense and defense; rules of the game. Problems in team handling and conditioning. Prereq: permission. 2 cr.

522. Theory of Coaching Football
Systems of play; team and individual offensive and defensive fundamentals; theory and strategy of team play; coaching methods, physical conditioning; rules. 2 cr.

#523. Theory of Coaching Hockey
Basic hockey skills. Fundamentals of individual and team offense and defense; coaching methods; rules. Prereq: students must have basic skating skills prior to taking course. 2 cr.

#524. Theory of Coaching Baseball
Batting and fielding; fundamentals of each position; problems of team play; coaching methods; physical conditioning; rules. Prereq: permission. 2 cr.

525. Theory of Coaching Soccer
Fundamental and advanced skills and techniques; offensive and defensive principles of team play; tactical formations and strategy; methods of training and practicing; rules. Prereq: permission. 2 cr.

526. Theory of Coaching Wrestling
Theory, practical teaching methods, and the development of skills and techniques from basic maneuvers to the more advanced. 2 cr.

528. Theory of Coaching Track and Field
Starting, sprinting, middle-distance and distance running, relay, hurdling, high and broad jumping, pole vault, shot putting, discus, hammer, and javelin. Methods of training and practicing. Prereq: permission. 2 cr.

#529. Theory of Coaching Gymnastics
Theory, practical teaching methods, and officiating. Construction of gymnastic routines, from elementary to international level. Prereq: permission. 2 cr.

#530. Theory of Coaching Swimming and Diving
Philosophy, historical development, and psychological theories of coaching. Mechanical and kinesiological aspects of the competitive strokes and required optional dives, low and high board. 2 cr.

#531. Theory of Coaching Field Hockey
Analysis of field hockey coaching techniques. New systems of play; use of interval training for preseason conditioning and inseason practices. Prereq: permission. 2 cr.

#532. Theory of Coaching Racquet Sports
Thorough and in-depth knowledge of the administration and coaching of major racquet sports: badminton, racquetball, squash, and tennis. Prereq: permission. 2 cr.

533. Basic Scuba
Pool and classroom instruction in scuba fundamentals, N.A.U.I. certification for successful completion of course and three open-water dives. Strong swimming ability required. Special fee. Lab. 2 cr.

540. Top Rope Rock Climbing
Introduction to the skills and safety systems associated with beginning rock climbing (e.g., top rope rock climbing, rappelling, bouldering) and the management of rock climbing in adventure programs. Prereq: permission. Special fee. Lab. 2 cr.

541. Management of Initiatives and Challenge Courses
Management of adventure initiatives and challenge courses as an educational and therapeutic medium with a variety of populations. Focus on skill development, processing techniques, rescue skills, evaluation techniques, and applications to specific client groups. Prereq: permission. Special fee. Lab. 4 cr. (May be repeated.)

542. Summer Backpacking Skills
Introduction to the basic summer backpacking skills, including equipment, nutrition, fitness, minimum impact camping, safety, beginning map and compass skills, leadership issues, and environmental ethics. Emphasis on technical applications and the implementation of these skills in adventure programs. Prereq: permission. Special fee. Lab. 2 cr.

543. Winter Backpacking Skills
Introduction to winter backpacking and wilderness living skills, including equipment, nutrition, minimum impact camping, snow physics, safety and medical issues, backcountry skiing techniques, snowshoeing, snow shelters, leadership issues, and environmental ethics. Emphasis technical applications and the implementation of these skills in adventure programs. Prereq: permission. Special fee. Lab. 2 cr. (May be repeated up to 4 credits.)

544. Map and Orienteering Skills
Advanced course focusing on wilderness and topographical map reading, route finding, terrain analysis, trip planning, and map-compass orienteering. Students will be provided with practical experience with all facets of overland/wilderness navigation and orienteering. Prereq: permission. Special fee. Lab. 2 cr. (May be repeated up to 4 credits.)

545. Wilderness Survival and Rescue
Advanced course focusing on wilderness search and rescue techniques, including wilderness first aid skills, preventing and preparing for survival situations, and coordinating search techniques. Wilderness Emergency Medical Technician (WEMT) status and skills highly desired. Prereq: permission. Special fee. Lab. 2 cr.

547. Lead Rock Climbing
Advanced course focusing on lead rock climbing skills, including equipment, climbing techniques, multiple pitch route techniques, safety systems, and high-angle rescue skills. Prereq: permission and previous experience in rock climbing at the 5.7 level or higher. Special fee. Multiple labs. 3 cr.

#548. High Altitude Mountaineering
Knowledge, skills, and attitudes of mountaineering at high altitudes. Focus on techniques used when leading adventure experiences with groups for extended periods of time and distances. Covers backcountry skiing, advanced climbing techniques, avalanche issues, safety systems, and rescue skills. Prereq: permission; previous backpacking and climbing experience. (PHED outdoor education majors only.) Special fee. Multiple labs. 4 cr. (May be repeated.)

550. Outdoor Education Philosophy and Methods
The rationale and basic structure of effective teaching techniques and procedures for outdoor education; uses an interdisciplinary approach; 3 lecture hours and field experience required. Special fee. 4 cr.

560. Psychology of Sport
Introduction to the discipline of sport psychology. Explores behavioral, cognitive, and social psychology in relation to elite, collegiate, and high school athletes, as well as recreational sport participants. 4 cr.

561. History of American Sport and Physical Culture
Major individuals, organizations, and trends that influenced the development of an American industry in sports, active recreation, and physical fitness. Readings, discussions, and research projects provide experience in the craft and utility of history. 4 cr.

563. Secondary Physical Education Pedagogy
Planning, implementing, and evaluating curricular models of instruction, as well as effective teaching strategies and styles relevant to secondary (grades 6–12) physical education is studied. Content and process knowledge is applied through microteaching episodes with peers. Systematic observation is introduced for the purpose of reflecting on teaching behaviors. Prereq: EDUC 500. Lab. 4 cr.

585. Emergency First Responder
Standards of practice that conform to the content of the U.S. Department of Transportation curriculum for First Responder. Initial evaluation and stabilization of patients at the scene of medical emergencies; CPR; and other basic medical care for illness and injury. Prepares the student for the New Hampshire First Responder Certification Examination. Prereq: permission. Lab. Special fee. 3 cr. Cr/F.

600. Movement Fundamentals
Includes content relevant to teaching elementary physical education. Students learn how to perform fundamental movement skills, design lessons based on skill themes, and the relationship of both to the content areas of educational dance and gymnastics. Prereq: permission. 3 cr.

601. Lifetime Sports
Provides teachers with the technical knowledge as well as the psychomotor and pedagogical skills necessary for instructing lifetime activities, including tennis and badminton. Prereq: permission. 3 cr.

602. Adventure Activities
Provides teachers with the technical, physical, and teaching skills necessary to instruct adventure activities, initiatives, ropes course management, and orienteering. Prereq: PHED pedagogy major or permission. Special fee. 3 cr.

603. Team Sports
Provides teachers with the technical, physical, and pedagogical skills necessary for instructing team sports, including soccer and volleyball.

Prereq: PHED pedagogy major or permission. 3 cr.

604A. Rhythmic Forms I
Emphasizes folk, square, and social forms of dance. Content focuses on the development of individual performance skills as well as the ability to design, implement, and evaluate learning episodes relative to the specific dance form. Prereq: PHED 600; permission. Coreq: PHED 604B. 1.5 cr.

604B. Rhythmic Forms II
Introduces student to modern dance and creative movement. Content focuses on the development of individual performance skills as well as the ability to design, implement, and evaluate learning episodes relative to the specific dance form. Prereq: PHED 600; permission. Coreq: PHED 604A. 1.5 cr.

605. Activity Teaching
Student teaches an activity course under supervision of activity program coordinator and receives twice the number of credits as that of the activity course. Check with activity program coordinator for available activity courses each semester. Prereq: sophomore standing; permission; current certification in activity (if appropriate). 1–4 cr. Cr/F. (May repeat once for a maximum of 8 cr.)

606. Secondary Physical Education Practicum
Students apply secondary content and process knowledge within microteaching experiences with peers. Students also teach grades 6 through 12 within the public school setting. Emphasizes lesson, unit plan design, and systematic observation. Prereq: PHED 563; permission. 3 cr.

607. Biology of Aging
Biological mechanisms of the aging process, with special emphasis on human aging; changes due to chronic disease. 4 cr.

608. Track and Field
Students acquire the foundational skills and learn about teaching strategies specific to the sport. (Open only to PHED pedagogy majors.) 1.5 cr.

609. Gymnastics
Students acquire the foundational skills and learn about teaching strategies specific to the sport. (Open only to PHED pedagogy majors.) 1.5 cr.

620. Physiology of Exercise
Acute and chronic effects of exercise. Muscle physiology, respiration, cardiac function, circulation, energy metabolism, and application to training. Prereq: ZOOL 507-508. 4 cr.

621. Exercise Laboratory Techniques
Administration of graded exercise tests on treadmill, cycle ergometer, and stepping bench. Monitoring physiological variables during the graded exercise test. Calculation of metabolic data resulting from the exercise test. Prereq: PHED 620. Special fee. 3 cr.

622. Principles and Applications of Health and Fitness
Provides students with theoretical, entry-level information relative to physical conditioning from childhood through adulthood, followed by practical, hands-on experience. Prereq: PHED 620; permission. 3 cr.

624. Physical Conditioning/Exercise Leadership Practicum
A) Aerobics class; B) Weight training class; C) UNH employee fitness program. Field experience teaching physical conditioning or practicing exercise leadership under appropriate supervision. Prereq: PHED 620; permission. 2 cr.

634. Sport Data Analysis
Applied course that analyzes traditional sports "stats" but emphasizes using basic statistical tools to evaluate sports data. Guest lecturers and practical problems are an inherent part of the course. Prereq: statistics course or permission. 4 cr.

635. Sport in Literature
Survey of sport as it is recorded in literature, both classical and contemporary, and the effect of sport on writing. 4 cr.

636. Introduction to Sports Information
Basic concepts of sports information related to preparation of material for public relations including radio, television, and publications. Includes guest lecturers and work in the UNH Sports Information Office. 2 cr.

650. Internship
Experiential learning in a setting appropriate to the major option and to student's objectives. An 8-cr. internship will require a minimum of 600 hours experience; fewer credits will require proportionally fewer hours Prereq: junior/senior major; permission. 2-8 cr. Cr/F.
A) Exercise Science. In an agency that offers physical activity programs of prevention, intervention, and rehabilitation. Activities include graded exercise testing, prescription, and leadership. Must have completed all requirements for the option. 8 cr.
B) Outdoor Education. Provides an appropriate transition from undergraduate education and future employment in the field of outdoor education. Generally done after students have completed all other requirements for the option. 2-8 cr.
C) Sport Studies. May be on- or off-campus with an approved organization. 2-8 cr. (May be repeated for a maximum of 8 credits.)

652. Clinical Kinesiology
The science of human movement from biomechanical, neuromuscular, and anatomical perspectives; human muscular, joint, and connective tissue anatomy; and skeletal muscle actions. Prereq: HHS major; ZOOL 507-508. Coreq: PHED 653A or 653B. Special fee. 4 cr.

653A. Musculoskeletal Assessment
Principles and methodology of joint range of motion, body mechanics, and muscle strength evaluation. Uses muscle palpation, goniometry, manual muscle testing, hand-held dynamometry, electromyography, and human prosections to facilitate understanding of musculoskeletal anatomy and assessment. Special fee. Prereq: ZOOL 507-508. Coreq: PHED 652. 2 cr.

653B. Biomechanical Analysis of Movement
Principles and methodology of analyzing posture and movement. Uses muscle palpation and testing, electromyography, and cinematography to facilitate students' understanding of movement analysis. Special fee. Prereq: ZOOL 507-508. Coreq: PHED 652. 2 cr.

658-659. Advanced Athletic Training
Factors involved in the care and recognition of athletic injuries. Mechanisms, etiology, and pathology. Clinical signs and symptoms. Techniques for performing appropriate test and assessment procedures. First aid procedures. 658 emphasizes fractures, soft tissue injury, and the lower extremities; 659 emphasizes upper extremities, head, and trunk. Prereq: PHED 502; ZOOL 507-508. Lab. 4 cr.

660. Therapeutic Exercise in Athletic Training
Rationale, use, and application of exercise in athletic injury rehabilitation. Basic components of designing and implementing rehab programs. Assessment of physical/injury status. Prereq: PHED 652; 658; 659. 4 cr.

662. Therapeutic Modalities in Athletic Training
Rationale, use, and application of therapeutic modalities in athletic injury rehabilitation. Principles of electrophysics and biophysics. Physiological effects on body tissues, indications and contraindications, and clinical applications. Prereq: PHED 658; 659. 4 cr.

665. Laboratory Practicum in Athletic Training
Minimum of 200 hours of experience in N.A.T.A.-approved athletic training clinical sites under the supervision of a N.A.T.A.-certified athletic trainer. 2 cr. Cr/F.
665A, Level I: General training room assignment and/or low-risk sport. Prereq: PHED 503B; permission. 2 cr.
665B, Level II: Assist with moderate- or high-risk sport. Prereq: 665A; permission. 2 cr.
665C, Level III: Assignment to moderate-risk sport as primary student. Prereq: 665B; PHED 658-659; permission. 2 cr.
665D, Level IV: Assignment to high-risk sport as primary student. Prereq: 665C; permission. 2 cr.
665E, Level V: Off-campus internship. Prereq: 665A; permission. 2 cr.

671. Motor Learning and Control
Study of the processes underlying human motor functioning. Emphasis on an understanding of motor behavior that specifically integrates psychology, neurology, motor skill acquisition, motor control, motor performance, and pedagogy. Practical application is required in the motor laboratory. Prereq: PHED 504. Lab. Special fee. 4 cr.

675. Motor Development
Characteristics of motor behavior across time, and the role of movement in children's and adolescents' total development. Growth processes, stage theory, as well as the relationship of maturation, experience, and the environment to

motor development. Prereq: PHED 600; permission. 4 cr.

681. Theory of Adventure Education
Basic skills and theories necessary in developing adventure education activities. Prereq: two outdoor adventure activity classes and permission. Three hours of lecture and field experience. Special fee. 4 cr.

682. Outdoor Leadership
Provides students with leadership experience and new skills in vigorous environments. Students must have previous outdoor skill experience. Three class hours per week plus two weekend field experiences. Offered both semesters —may be taken once in each semester. Special fee. 2 cr. Cr/F.

683. Organization and Administration of Outdoor Education
Study of the administration of outdoor education programs using a variety of organizational models. Students develop and, through simulated exercises, manage a program. Field experience. Prereq: PHED 550; junior standing. Special fee. 4 cr.

685. Emergency Medical Care: Principles and Practices
Basic emergency health care, including cardiopulmonary resuscitation (CPR), trauma patients, medical and environmental emergencies, and childbirth. Includes clinical experience with a local hospital and ambulance service. Prepares the student for the National Registry of EMTs Examination. Prereq: permission. Lab. Special fee. 4 cr. Cr/F.

686. Wilderness Emergency Medical Care
Standards of practice for professionals providing emergency medical care in remote areas. Consideration of prolonged transport times, severe environments, and the use of portable and improvised equipment. Topics include wilderness trauma and illness, search and rescue operations, and environmental emergencies. Certification upon course completion provided by the National Association for Search and Rescue (NASAR). Prereq: current EMT-Basic and CPR certifications; permission. Special fee. 3 cr.

692. Elementary Physical Education Pedagogy
Planning, implementing, and evaluating a movement-based curricular model of instruction relative to teaching preschool and elementary-aged children physical education. Systematic observation, teaching strategies and styles, lesson design, and methods of integrating academic subject matter into elementary physical education. Prereq: PHED pedagogy or FS major; PHED 600, 675; permission. 4 cr.

693. Teaching Assistantship
B) Exercise Leader; C) Outdoor Education; D) Science Labs; E) Cardiac Rehabilitation. Students serve as teaching assistants in assigned class activities. Assignments to be made by the class instructor may include teaching assistants' and administrative duties. May take two different sections. Prereq: junior standing; permission of adviser and instructor. (Max. 4 cr.) 2 cr. Cr/F.

696. Independent Study
An advanced, individual scholarly project under the direct supervision of a faculty member. Prereq: junior or senior; permission. 2–4 cr. to a maximum of 8 cr.

#699H. Honors Project
Project first involves tutorial sessions to introduce the student to the experimental design, after which a research question is developed. After an appropriate literature review, the student collects and analyzes data, forms conclusions, and prepares a written report on the findings. 4 cr.

#700. Applied Statistics
Statistical procedures and associated elements of basic research design with direct, practical application to areas within physical education and other health disciplines. Prereq: PHED 504 or equivalent. 4 cr.

706. Neurology
Morphology, physiology, and histology of the human nervous system. Lab. Prereq: ZOOL 507-508. 4 cr.

710. Organization and Administration of Athletic Training Programs
Principles of organization and administration of athletic training programs; management of personnel; legal aspects; relation of athletic trainer to athletic programs and sports medicine team. 4 cr.

715. Seminar in Athletic Training
Exposure to varied medical professionals and surgical procedures in athletic medicine. Student project and presentation on surgery observation and on current issues in athletic training. Prereq: PHED 658-659; permission. 2 cr.

722. Graded Exercise Testing and Exercise Prescription
Graded exercise testing and its application to the prescription of exercise. Special emphasis on the patient with cardiovascular disease. Prereq: PHED 620. 4 cr.

#723. Exercise Epidemiology
Hazards and benefits of exercise, physical activity, and physical fitness in relation to health from an epidemiological perspective. Prereq: PHED 620. 4 cr.

725. Motor Control Issues in Motor Dysfunction
Examination of normal and pathological movement patterns; important anatomical, physiological, and biomechanical variables constraining movement organization; and appropriate motor programs for ameliorating physical and motor dysfunction in special populations. Prereq: kinesiology and neurology or motor learning or equivalent; PHED 620. Lab. 4 cr.

727. Introduction to Management of Physical Activity Programs
Provides students with the knowledge and practical managerial and marketing experience necessary for establishing exercise programs. Covers administrative tasks, programming competencies, facility design, and equipment selection. Also studies financial and legal issues. Prereq: PHED 722; exercise science majors only. 4 cr.

732. Electrocardiography
Introduction to the reading and assessment of EKGs. Prereq: PHED 620 or equivalent. 4 cr.

733. Environmental Physiology
Human physiological response to both acute and chronic effects of various environmental conditions, such as heat, cold, altitude, and air pollution. Prereq: PHED 620 or permission. 4 cr.

734. Advanced Exercise Leadership
Group/individual exercise programs for healthy and high-risk populations. Topics include exercise programming, exercise prescription, decision making, safety and emergency procedures, and administrative concerns. Prereq: PHED 620, 621, 722, and 732. Special fee. 4 cr.

735. Advanced Scuba
Classroom, pool, and open-water instruction in advanced diving techniques. Topics covered are navigation, search and recovery, boat diving, low visibility, surface supplied diving, ice diving, diving accident management, hyperbaric medicine, underwater physiology, and scientific research methods for divers. Prereq: open water certification; permission. Special fee. Lab. 3 cr. Cr/F.

740. Athletic Administration
Introduces basic management components and processes used in the successful administration of school and college athletic programs. Topics include: planning, organizing, and managing sports programs, personnel, and policies; game scheduling; finances and facilities; equipment and event management; marketing and media relations; and key legal issues. Prereq: permission. 4 cr.

741. Sport in Society
Investigation of interrelationships among sport, culture, and society in an attempt to understand better the role and function of sport in contemporary society. Overview of selected sociocultural factors that influence and result from participation in sports. Prereq: SOC 400 or permission. 4 cr.

742. Diagnostic Motor Assessment
Overview of diagnostic and prescriptive procedures used in special physical education. Psychomotor assessment instruments used by practitioners in the field are described that can be applied when discerning level of performance in children with special needs. Prereq: measurement procedures in physical education. Lab. 3 cr.

743. Sport Marketing
Survey of concepts and processes used in the successful marketing of sport programs and events. Special emphasis on the unique or unusual aspects of sport products, markets, and consumers. Prereq: MKTG 550 or permission. 4 cr.

#744. Medical and Exercise Issues of Disabling Conditions
Study of disabilities caused by anomalies found in the neurological, cardiorespiratory, sensory,

and musculoskeletal systems. Addresses exercise and programming techniques necessary for physical and motor development relative to present physiological functioning. Prereq: kinesiology or exercise physiology or equivalent. 3 cr.

750. Theories of Motivation in Sport and Exercise
Social cognitive theories of achievement motivation as they relate to sport and exercise participation. Special consideration given to the ways coaches, exercise leaders, and physical education teachers should motivate individuals. Prereq: PSYC 401; permission. 4 cr.

#760. Application of Research to Teaching and Coaching
Pertinent research findings in sport psychology, sport sociology, exercise physiology, biomechanics and kinesiology, and motor learning and development. Prereq: PHED 504 or equivalent; permission. 4 cr.

761. Senior Seminar in Sport Studies
Discussions of sport studies topics, such as gambling, aggression, media, gender, race, class. Students will consider different disciplinary approaches to these topics and develop research proposals to advance knowledge related to their interests. Prereq: PHED 561, 741, 780, or permission. 4 cr.

770. Psychological Skills in Performance
Provides essential elements of psychological skills training in performance. Focuses on mental aspects that enhance or inhibit physical performance. Theory, direct skill acquisition, and skill application are all integral to this course. Topics include: progressive relaxation, meditation, hypnosis, goal setting, and stress inoculation testing. Special fee. Prereq: PSYC 401 or PHED 780. 4 cr.

780. Psychological Factors in Sport
Factors of outstanding athletic achievement; psychological variables in competition; the actions and interactions of sport, spectator, and athlete. Prereq: PSYC 401 or PHED 671. 4 cr.

781. Special Physical Education Pedagogy
Overview of special physical education. Addresses modifying instruction, expectations, and learning environment to accommodate physical and motor behaviors of students with disabilities. Prereq: permission. Lab. 4 cr.

#782. Therapeutic Applications of Adventure Programming
Examines the use of adventure activities as elements of therapeutic treatment plans. Incorporates theoretical seminars and associated practical experiences. Prereq: PHED 550 or 681; permission. 4 cr.

783. Elementary Physical Education Practicum
Provides opportunities for developing and refining elementary and special physical education movement content with pedagogical processes. Emphasis on demonstrating competence in teaching and establishing a least-restrictive learning environment. Prereq: PHED 675; permission. 3 cr.

#785. Applied Behavior Management
Overview of applied behavior management procedures used in special physical education. A number of investigations and approaches used by researchers and practitioners in the field are described, practiced, and critically analyzed. Practice and theory of behavior management, to be applied with children who continually misbehave, exhibit behavior disorders, or have an emotional disturbance. Prereq: permission. Lab. 4 cr.

790. Social and Health Issues in Sport Psychology
Current trends in social and health psychology as they pertain to the competitive sports environment. Includes adherence motivation, bulimia and anorexia in athletes, self-theory, exercise and depression, and substance abuse in sports. Prereq: PSYC 401 or PHED 671. 4 cr.

798. Special Topics
New or specialized courses not normally covered in regular course offerings. Prereq: permission. May be repeated up to 8 cr. 1–4 cr.

Physics (PHYS)

(For program description, see page 66.)

Chairperson: John R. Calarco
Professors: Roger L. Arnoldy, L. Christian Balling, John R. Calarco, Edward L. Chupp, John F. Dawson, Jochen Heisenberg, Joseph Hollweg, Richard L. Kaufmann, Robert H. Lambert, Martin A. Lee, Harvey K. Shepard, Robert E. Simpson, Roy B. Torbert, John J. Wright
Research Professors: Terry Forbes, William R. Webber
Associate Professors: Olof Echt, F. William Hersman, Dawn C. Meredith, Eberhard Möbius, James M. Ryan
Research Associate Professors: David J. Forrest, W. T. Vestrand
Assistant Professor: Robert E. Leuchtner
Research Assistant Professors: Philip A. Isenberg, Lynn M. Kistler, Craig A. Kletzing, Mark L. McConnell, Terrance G. Onsager

401-402. Introduction to Physics I and II
Broad survey of classical and modern physics. Designed to enable students to appreciate the role of physics in today's society and technology. Emphasis on the fundamental laws of nature on which all science is based, with some examples of interest to biologists. Knowledge of high school algebra, geometry, and trigonometry essential. Special fee. Lab. 4 cr. each.

#405. Concepts of Physics
Descriptive course investigating a limited number of important physical systems. Emphasis on how the system is to be investigated and the patterns in which the results fall. Intuitive concepts used in investigations traced into their application in modern physics. Patterns of thought in physics related to patterns of thought in liberal arts. Recommended for liberal arts juniors and seniors. 4 cr. (Not offered every semester.)

406. Introduction to Modern Astronomy
Descriptive coverage of contemporary astronomical and astrophysical techniques with a review of current knowledge and theories concerning the solar system, galaxies, and the universe. Recommended for liberal arts and beginning science students. Knowledge of high school algebra is assumed. Special fee. Lab. 4 cr.

407-408. General Physics I and II
Introductory course emphasizing mechanics, heat, sound, and electromagnetism. Recommended for the student specializing in science and engineering. Prereq: thorough knowledge of algebra, geometry, and trigonometry; MATH 425 for 407; MATH 426 for 408, or taken concurrently. Students may not receive credit for both 401 and 407 (or 402 and 408). Special fee. Lab. 4 cr. each.

412. Technical Physics
Introductory course emphasizing the fundamentals of mechanics, heat, electricity, and other subjects underlying modern machinery and instruments. Recommended for Thompson School students. Prereq: algebra and trigonometry. Lab. 4 cr.

505. General Physics III
Electromagnetic waves, geometrical and physical optics, relativity, atomic physics, elementary quantum mechanics, molecular physics, and nuclear physics. Prereq: PHYS 407-408; MATH 425, 426. Special fee. Lab. 4 cr.

508. Thermodynamics and Statistical Mechanics
Classical and statistical approach to thermodynamics, kinetic theory. Prereq: PHYS 407-408, 505 or equivalent; MATH 528. 4 cr.

605. Experimental Physics I
Circuit design with passive and active elements including transistors and operational amplifiers; electrical measurements for experimental physics; digital electronics, microprocessors, and interfacing techniques. Prereq: PHYS 408, 505, 615; MATH 527. Lab. 5 cr.

615. Introduction to Mathematical Physics
Application of mathematical analysis to physics, including complex numbers, multiple integrals, vector analysis, and Fourier series. Prereq: MATH 425-426; 527-528. 4 cr.

616. Physical Mechanics
Analytical treatment of classical mechanics covering the dynamics of particles and rigid bodies, at an intermediate level. Prereq: PHYS 407; MATH 527-528 (or taken concurrently); PHYS 615. 3 cr.

701-702. Introduction to Quantum Mechanics I and II
Nonrelativistic Schroedinger equation, the hydrogen atom, applications to atomic and nuclear structure. Prereq: PHYS 615-616; MATH 527, 528; MATH 646 desirable; permission. 4 cr. each.

703-704. Electricity and Magnetism I and II
Foundation of electromagnetic theory; electrostatics, dielectric theory, electromagnetism, magnetic properties of matter, alternating cur-

rents, Maxwell's field theory. Prereq: PHYS 615; MATH 527, 528; MATH 646 desirable; permission. 4 cr. each.

705. Experimental Physics III
Modern physics experiments and special project problems assigned to individual students. Prereq: PHYS 605; senior standing in physics. Lab. 4 cr.

707. Computational Physics
Application of numerical methods to physics, including integration of ordinary and partial differential equations, matrix methods, Fast Fourier transforms, and quadrature. Prereq: knowledge of a high-level programming language (e.g., FORTRAN or C); MATH 527, 578; PHYS 407-408, 505, and 615. 4 cr. (Not offered every year.)

708. Optics
Geometrical optics, electromagnetic theory of light, interference, diffraction, polarization, related phenomena and nonlinear optics. Prereq: PHYS 615, 616; MATH 527, 528; MATH 646 recommended. Lab. 4 cr.

710. Introduction to Modern Astrophysics
Review of the sun, stars, Milky Way, external galaxies, and expansion of the universe. Recent discoveries of radio galaxies, quasi-stellar objects, cosmic black-body radiation, x rays, and gamma rays precede a discussion of Newtonian and general relativistic cosmological models, steady-state/big-bang theories, and matter-antimatter models. Prereq: PHYS 616; MATH 527 or permission. 4 cr. (Offered if sufficient demand.)

712. Physics of the Ionosphere
Introduces basic plasma physics using a case study of the Earth's ionosphere and its connection to both the upper atmosphere and to the Earth's magnetosphere. Topics include single particle motion, fluid and kinetic descriptions of ionospheric plasma, wave propagation, and instabilities. Prereq: PHYS 408; PHYS 703 or EE 603;/or permission. (Also offered as EOS 712.) 4 cr.

718. Introduction to Solid State Physics
Theory and experiment underlying the behavior of solids. Transport theory, surface studies, and the interaction of radiation and matter. Operation of semiconducting and superconducting devices and lasers. Prereq: PHYS 615; 616; 701. 4 cr. (Offered if sufficient demand.)

720. Nuclear Physics
Nuclear phenomenology, reactions, models, radiation, interaction of radiation with matter; accelerators; properties and interactions of elementary particles; symmetries and symmetry breaking; standard model. Prereq: PHYS 702, 704, or permission of instructor. 4 cr.

#791. Special Topics
Any selected topics not covered sufficiently in a general course may be studied. May be repeated to eight credits. 4 cr.

795. Independent Study
Individual project under direction of a faculty adviser. Prereq: department permission. 1–8 cr.

Plant Biology (PBIO)

(For program description, see page 48.)

Professors: Robert O. Blanchard, A. Linn Bogle, Garrett E. Crow, George O. Estes, Curtis V. Givan, Yun-Tzu Kiang, J. Brent Loy, William E. MacHardy, Arthur C. Mathieson, Subhash C. Minocha, Owen M. Rogers, Otho S. Wells
Associate Professors: Alan L. Baker, Thomas M. Davis, Wayne R. Fagerberg, Leland S. Jahnke, Anita S. Klein, Thomas D. Lee, James R. Mitchell, James E. Pollard, John M. Roberts
Adjunct Assistant Professors: Rakesh Minocha, Cheryl A. Smith, Janet R. Sullivan
Extension Educator: William G. Lord

The following faculty members associated with the Thompson School of Applied Sciences teach courses co-listed with the Department of Plant Biology: John L. Hart, Associate Professor; Christopher Robarge, Horticultural Facilities Manager; Andrew B. Conroy and Dana M. Sansom, Assistant Professors.

400. The Power of Plants
Global experience of human interactions with plants and ways in which plants have contributed to the development and flourishing of human societies. Includes role of plants in providing sustenance, clothing and shelter, quest for spices and the historical consequences of plant explorations and exploitations, the power to heal or kill, plants in mythology and spiritual endeavors, plants that alter consciousness, plant diseases and human history, plants as energy for society, and the Green Revolution—global change and feeding the world in the future. Lab. Special fee. 4 cr.

401. Plant Biology Orientation
Overview of plant biology research and teaching facilities; introduction to research, extension, and educational functions within the department; career opportunities in plant biology. Required of all plant biology majors. 1 cr. Cr/F.

405. Natural History of Hawaii (winter break field course)
A two-week winter-term field course designed to provide interdisciplinary exposure to a multicultural, "melting pot" society, aspects of Polynesian culture, Hawaiian history, tropical biology, volcanic geology, and island building. Prereq: permission. 4 cr. IA.

412. Introductory Botany
Plants in their natural environments: their structure, function, growth, reproduction, and evolutionary diversity. Special fee. Lab. 4 cr.

421. Concepts of Plant Growth
Fundamentals underlying plant growth and response in natural and modified environments. Special fee. Lab. 4 cr.

427. Landscaping the Home Ground
Design and maintenance of small properties; arrangement, plant use for the beautification of home surroundings. Lab. 4 cr.

432. Animal Forages
Production and utilization of New England forage crops. Selection of species and varieties; cultural and harvesting practices for top production of excellent quality. Combining uses for greatest efficiency in feeding various livestock classes. Lab. (Also listed as TSAS AAS 232.) 3 cr.

445. Nursery Culture and Operation
Development of a nursery business from site selection to marketing the finished product, with emphasis on plant production. Prereq: permission. (Also offered as TSAS HT 245.) Lab. 3 cr.

454. Landscape Construction and Maintenance
Landscape contracting: basic construction materials and methods, plant materials, blueprints and specifications, estimating and bidding; landscape installation; and landscape maintenance. Prereq: permission. (Also offered as TSAS HT 254.) 3 cr.

458. Bedding Plant Production
Bedding plant production, cultural requirements, crop timing, marketing principles. Includes common annuals, perennials, vegetables, and herbs of the Northeast. Field trips. Seven-week module. Prereq: permission. (Also offered as TSAS HT 258.) Lab. 2 cr.

461. Interior Plants and Plantscaping
Establishment and maintenance of interior foliage plants for the home and commercial operation, including cultural requirements, identification, acclimatization; bidding, designing, and drafting displays areas. Special fee. Lab. 3 cr.

463. Floricultural Crop Production
Leading cut flower crops, potted plants, and bulbous crops, including cultural requirements, crop timing, harvesting procedures, distribution systems, and marketing principles. Prereq: permission. (Also offered as TSAS HT 263.) Lab. 3 cr.

464. Horticultural Pruning
Basic pruning techniques for fruits and ornamentals: apples, peaches, raspberries, blueberries, grapes; deciduous shrubs and trees; herbaceous materials. Special fee. Lab. 2 cr.

503. Introduction to Marine Biology
Organization of marine biological communities. Various marine environments — pelagic, benthic, temperate, tropical — and their characteristic communities. Major emphasis on the approaches (e.g., analysis of energy flow and predator-prey interactions) used to analyze marine communities as well as the sampling techniques employed for each approach and the characteristic habitat type. Prereq: BIOL 411-412. Lab. (Also listed as ZOOL 503.) 4 cr.

535. Domestication and Use of Plants
Genetic process of plant domestication, origin of agriculturally based cultures, use of plant or plant-derived products in early and contemporary societies. Lab. 4 cr.

565. Turf Management
Adaptation and management of fine turf grasses for recreational, aesthetic, and functional use. Lab. 4 cr.

566. Systematic Botany
Scientific basis of plant taxonomy and the identification and classification of major plant families, native trees, shrubs, and wild flowers. Field trips, plant collection. Prereq: BIOL 412 or PBIO 412 . Lab. 4 cr.

601. Terrestrial Plant Ecology
Regulation of distribution and abundance of terrestrial plants by physical and biotic environmental factors; ecology of plant life history patterns; development and structure of plant communities; ecosystem structure and function. Occasional Saturday field trips. Prereq: PBIO 412, BIOL 412, or equivalent with permission. Lab. 4 cr. (Not offered every year.)

606. Plant Physiology
Structure-function relationship of plants, internal and external factors regulating plant growth and development, plant hormones, plant metabolism, water relations, and mineral nutrition. Prereq: PBIO 412, BIOL 411-412, or PBIO 421; one year of chemistry;/or permission. Coreq: PBIO 608. 3 cr.

608. Plant Physiology Laboratory
Analytical techniques for plant physiology, effects of growth regulators on plant growth and development, cell and tissue culture, enzyme kinetics, and plant water relations. Coreq: PBIO 606. Special fee. 2 cr.

612. Genetics of Domesticated Plants
Introduction to Mendelian inheritance, plant domestication, reproductive systems, crop improvement, and seed technology. Prereq: CHEM 403; PBIO 412 or equivalent. *Will not satisfy biology core requirement for genetics.* 4 cr.

625. Introduction to Marine Botany
Life history, classification, and ecology of micro- and macroscopic marine plants, including phytoplankton, seaweed, and salt marsh plants, and the interactions between humans and marine plant communities. Occasional Saturday morning field trips. Prereq: BIOL 412 or PBIO 412 or permission. Lab. 4 cr.

651. Plant Pathology
Nature, symptomatology, etiology, epidemiology, and control of important plant diseases. Prereq: PBIO 412, BIOL 411-412, or equivalent. Lab. 4 cr.

652. Vegetable Crops
Technology and systems for producing and marketing vegetables locally and nationally; study of characteristics of specific crops and of their response to environment. Prereq: PBIO 421 or equivalent. 4 cr. (Not offered every year.)

653. Forest and Shade Tree Pathology
Principles, symptomatology, etiology, and control of forest and shade tree diseases. Prereq: PBIO 412 or equivalent. Lab 4 cr. (Not offered every year.)

655. Fruit Crops
Tree fruits and small fruits of the temperate zone: culture, management, and marketing for the small enterprise. Lab. 4 cr.

666. Summer Flora of New Hampshire
Study of the flora of New Hampshire with an in-depth look at the major vegetation types. Fieldwork will include trips to study flora of forests, dunes, salt marshes, swamps, bogs, lakes, ponds, streams, and alpine. Prereq: basic botany or permission. Field trips. Special fee. 4 cr. (Summer session only.)

672. Plant Propagation
Sexual and asexual propagation of horticultural plants. Lab. 4 cr.

678. Ornamental Plants
Identification, culture, and use. Prereq: PBIO 566 or equivalent. Lab. 4 cr.

682. Sustainable Food Systems
Resource use in the food chain. Historical perspective of traditional resource management and sustainability. Genetic and physiological basis for improved resource use in plant/animal systems. Resource depletion and opportunities for recovery/substitution. Comparative analysis of enterprises in terms of profitability. Socioeconomic and ethical issues associated with technological innovation. Field trips. Lab. 4 cr.

689. Herbaceous Landscape Plants
Principles and practices of growing and using annuals, herbaceous perennials, and bulbs in the landscape. Emphasis on identification and the garden designs in which they are used. Lab. 4 cr.

703. Evolutionary Survey of the Plant Kingdom
Evolutionary origins of the green photosynthetic plants, as seen in living groups and the fossil record; their roots in the protista; the major trends of evolutionary specialization in form, structure, and reproductive mechanisms linking the major divisions and culminating in the flowering plants. Prereq: BIOL 412 or PBIO 412. Lab. 5 cr.

705. Population Genetics
Population growth and regulation; genetic variation; factors affecting gene frequency; ecological genetics. Prereq: principles of genetics or permission. (Also offered as GEN 705.) 4 cr. (Not offered every year.)

706. Biology of Weeds
Ecology and reproductive biology of weed species. Dormancy and germination, dispersal, and patterns of weed establishment. Physiology and biochemistry of herbicides. Genetic engineering and environmental issues. Prereq: BIOL 411-412 or PBIO 412; CHEM 403-404. 2 cr.

708. Biology of Weeds Laboratory
Application of weed identification and weed control practices, considering various types of crops (including ornamentals), cultural control, herbicide equipment, application, and safety. Environmental considerations. Field trips. Special fee. Co- or prereq: PBIO 706. 2 cr.

709. Plant Stress Physiology
Physiological and biochemical mechanisms of plant responses to abiotic stresses including drought, salt, high and low temperature, visible and ultraviolet radiation, heavy metals, and air pollutants. Current hypotheses, agricultural and ecological implications are discussed. Prereq: plant physiology; biochemistry;/or permission. 3 cr.

713. Photosynthesis
Physiology and biochemistry of photosynthesis in higher plants and microorganisms: light reactions, electron transport, membrane structure and function, carbon assimilation pathways, energy conservation, and metabolic regulation. Agronomic and ecological aspects of photosynthesis are examined. Prereq: plant physiology or biochem. 4 cr. (Not offered every year.)

714. Electron Microscopy
Theory and principles involved in preparing plant and animal tissue for observation with the transmission (TEM) and scanning (SEM) electron microscopes; shadow casting; photographic techniques; stereology; and presentation of micrographs for publication. Prereq: permission. Coreq: PBIO 715. 2 cr.

715. Electron Microscopy Lab
Practical application of theoretical principles and practices used in preparing and observing plant and animal tissues with the transmission and electron microscopes. Student project assigned. Prereq: permission. Coreq: PBIO 714. Special fee. 3 cr.

#716. Wetland Delineation
Examines the soils, vegetation, and hydraulic functions of coastal and central New England wetlands. Students are responsible for collecting and identifying aquatic plant species, the description of wetland soils, and the delineation of wetland boundaries. Two time options meet over five weeks (Friday and Saturday or Wednesday and Thursday) during July and August: 4 hrs of lecture, 4 hrs of lab, and 8 hrs of fieldwork per week. For juniors, seniors, grad students, and professionals. Prereq: permission. (Also offered as WARM 716.) Special fee. 4 cr.

717. General Limnology
Special relationships of freshwater organisms to the chemical, physical, and biological aspects of the aquatic environment. Factors regulating the distribution of organisms and primary and secondary productivity of lake habitats. Prereq: BIOL 541 or equivalent. (Also offered as ZOOL 717.) 4 cr.

719. Field Limnology
Freshwater ecology examined through laboratory exercises with freshwater habitats. Methods to study freshwater lakes; interpretation of data. Seminars and occasional Saturday field trips. Prereq: present or prior enrollment in PBIO 717, ZOOL 717, or equivalent; permission. (Also offered as ZOOL 719.) Lab. 4 cr.

721. The Microscopic Algae
Survey of phytoplankton and periphyton in local marine and freshwater habitats. Identification, systematics, and evolution. Class and individual collection trips. Prereq: BIOL 412 or PBIO 412 or 703. Lab. 4 cr. (Not offered every year.)

722. Marine Phycology
Identification, classification, ecology, and life histories of the major groups of marine algae,

particularly the benthonic marine algae of New England. Periodic field trips. Prereq: BIOL 412 or PBIO 412 or 703. Lab. 4 cr. (Not offered every year.)

724. Freshwater Algal Ecology
Survey of freshwater algal habitats; physiological explanation of population models. Individual experimental projects. Prereq: PBIO 717 or permission. 4 cr. (Not offered every year.)

725. Marine Ecology
Marine environment and its biota, emphasizing intertidal and estuarine habitats. Includes field, laboratory, and independent research project. Prereq: general ecology; permission. Marine invertebrate zoology, oceanography, and statistics are desirable. (Also offered as ZOOL 725.) 4 cr. (Not offered every year.)

727. Algal Physiology
Survey of major topics in the physiology and biochemistry of marine and freshwater algae including: nutrition, metabolic pathways, reproductive physiology, storage and extracellular products, cell inclusions, growth and development. Prereq: plant physiology and introductory biochemistry or permission. 2 cr. (Not offered every year.)

729. Algal Physiological Laboratory
Useful laboratory techniques in studying the physiology of freshwater and marine algae. Experiments in nutrition, metabolism, pigment, and enzyme analysis. Small research project required. Prereq: concurrent registration in PBIO 727; permission. 2 cr. (Not offered every year.)

#740. Evolutionary Biology
Origin of life; source of genetic variation, population structure, mechanisms of evolution; molecular evolution; ecological adaptation in animals, plants, and human beings; community structure and evolution. Prereq: principles of genetics or permission. 4 cr. (Not offered every year.)

#742. Physiological Ecology
Physiological responses of plants to the physical environment; energy exchange, light and photosynthesis, water relations, and mineral nutrition. Prereq: PBIO 606 or permission. Lab. 4 cr. (Not offered every year.)

745. Plant Community Ecology
Methods for analysis of biological communities; ordination and classification of communities; theoretical and empirical investigation of factors controlling community structure; theory and modeling of succession. Occasional Saturday field trips. Prereq: intro. statistics and intro. ecology (BIOL 541, PBIO 601, or equivalent). Lab. 4 cr. (Not offered every year.)

#747. Aquatic Higher Plants
Flowering plants and fern relatives found in and about bodies of water in the northeastern United States; extensive field and herbarium work, preparation techniques, and collections. Prereq: PBIO 566 or permission. Lab. 4 cr. (Not offered every year.)

751. Cell Culture
Theory and principles fundamental to the culture of cells in vitro. Introduction to techniques of preparation and maintenance of animal, plant, insect, and fish cell cultures. Application of cell culture to contemporary research in biological sciences. Prereq: gen. micro.; permission. (Also offered as ANSC 751 and MICR 751.) Lab. 4 cr.

753. Cytogenetics
Chromosome structure, function, and evolution. Eukaryotic genome organization. Theory of, and laboratory techniques for, cytogenetic analysis in plants and animals. Prereq: prin. of genetics. Special fee. Lab. (Also offered as GEN 753.) 4 cr. (Not offered every year.)

758. Plant Anatomy
Anatomy of vascular plants, emphasizing structure and development of basic cell and tissue types, and of the major plant organs. Prereq: BIOL 412 or PBIO 412. Lab. 5 cr. (Not offered every year.)

761. Plant Geography
Distribution of plants, a consideration of world vegetation types and floras, and problems of endemism with emphasis on North America; major influential factors such as geologic, climatic, edaphic, and biotic. Four Saturday field trips. Prereq: PBIO 566 or permission. 4 cr. (Not offered every year.)

764. Microtechnique
Methods of preserving cell and tissue structure, embedding, sectioning, and staining plant tissues, and an introduction to microscopy. Prereq: permission. Lab. 4 cr. (Not offered every year.)

765. Molecular Biology and Biochemistry of Plants
Molecular mechanisms and regulation of plant metabolic function. Structure and function of cellular constituents of plants; role of secondary metabolites. Emphasis on developments in the current literature. Prereq: BCHM 658 or 751 and BIOL 604 or permission. Complements PBIO 774/775. 3 cr. (Also offered as BCHM 765.)

#773. Breeding Improved Varieties
Techniques for creating new varieties of crop and ornamental plants. Prereq: genetics. 4 cr. (Not offered every year.)

774. Plant Cell Culture and Genetic Engineering
Theory and techniques of cell/tissue culture and genetic manipulation in plants, transformation vectors, somatic cell genetics, regulation of foreign gene expression, molecular basis of agriculturally important traits, environmental and social implications of genetic engineering in plants. Prereq: BIOL 604 or permission. Coreq: PBIO 775. (Also offered as GEN 774.) 3 cr. (Not offered every year.)

775. Plant Cell Culture and Genetic Engineering Lab
Techniques of plant cell and tissue culture, protoplast fusion, genetic transformation. Mutant cell selection, analysis of foreign gene expression. Coreq: PBIO 774. (Also offered as GEN 775.) Special fee. 2 cr.

776. Radiation Biology
Nature, sources, and behavior of ionizing radiation and its interaction with biological systems. Detection, measurement, and dosimetry techniques. Radiation effects on cells, organs, and organisms. Radiotracer techniques in biological research and medicine. Terrestrial and marine radioecology; pathways through the food chain. Environmental radioactivity, nuclear power, weapons systems, and waste disposal. Lab. Special fee. 4 cr.

795. Investigations in Plant Biology
A) Systematic Botany; B) Plant Physiology; C) Plant Pathology; D) Plant Anatomy; E) Plant Ecology; F) Mycology; G) Cell Biology; H) Phycology; I) Botanical Teaching; J) Morphology; K) Cell Physiology; L) Scientific Writing; M) Microtechnique; N) Cell and Tissue Culture; O) History of Botany; P) Genetics; Q) Plant Utilization. Individual projects under faculty guidance. Prereq: permission. 1–6 cr. (4 cr. max. per semester for any single section.)

797. Senior Seminar
Library research, presentation, and discussion of current topics in plant biology. Attendance of selected seminars in related subject areas. Required of all senior majors in horticulture and agronomy. 1 cr. Cr/F. (Fall semester only.)

#799. Honors: Senior Thesis
Students work under the direction of a faculty sponsor to plan and carry out independent research resulting in a written thesis. Two-semester sequence; IA grade (continuous course) given at end of first semester. 4–6 cr.

Political Science (POLT)

(For program description, see page 34.)

Chairperson: B. Thomas Trout
Professors: Bernard K. Gordon, David L. Larson, David W. Moore, George K. Romoser, B. Thomas Trout, Susan O. White
Associate Professors: Warren R. Brown, Robert E. Craig, Judith A. Gentleman, John R. Kayser, Lawrence W. O'Connell, Clifford J. Wirth
Assistant Professors: Anne Marie Cammisa, Aline M. Kuntz, Lawrence C. Reardon, Susan J. Siggelakis

Introductory Courses

401. Politics and Society
Introduction to the nature of politics and political institutions. Emphasis on political behavior and continuing issues of modern politics, such as power, authority, legitimacy, freedom, and order. 4 cr.

402. American Government and Politics
Institutions and processes of national govern-

ment in the United States; political culture of the American people. Structure of national government; role of general public in government; cultural influences on American politics. 4 cr.

403. United States in World Affairs
Major issues in world affairs since 1945 as they relate to United States foreign policy: U.S.–Soviet relations, third-world politics, regional and alliance politics, weapons technology and resource depletion, economic development, and population control. 4 cr.

595, 596. Explorations in Politics
Designed to meet special interests of students and instructors in exploring selected issues in political science. See departmental listings for semester offerings. 2–4 cr.

American Politics

500. American Public Policy
Political and economic factors that mold the processes by which American policymakers deal with such domestic issues as crime and violence, poverty and inequality, inflation and unemployment, urban blight and renewal, and energy and the environment. 4 cr.

502. State Government and Federalism
Powers, politics, and constitutional setting of American state governments: state legislatures, governorships, party systems, interest groups, taxation, welfare, environment, and education. 4 cr.

#503. Local Government and Politics
Structure, politics, and legal setting of American local government, including towns, cities, counties, and special districts. Community power and decision making; town meetings and such issues as home rule, zoning, and the property tax. 4 cr.

504. American Presidency
Role and powers of the presidency in domestic and foreign affairs. The president as administrator, policymaker, and political leader. Executive-congressional relations. 4 cr.

505. American Congress
Role and powers of Congress as national lawmaker and check on the executive branch: committee structure, concepts of representation, legislative oversight, and party cleavage, federal budget control and foreign policy involvement. 4 cr.

#506. Parties, Interest Groups, and Voters
Role of political parties as organizers and managers of social conflict. Role of voters in controlling parties and government. Influence of interest groups in the electoral process and in governmental decision making. 4 cr.

507. Politics of Crime and Justice
Criminal justice in theory and practice; contemporary role of police, prosecutors, judges, juries, counsel, and interest groups in the administration of criminal justice. 4 cr.

508. Supreme Court and the Constitution
Supreme court treated as a political institution whose historic mission is to decide all controversies arising under the constitution between the nation and the states, the President and Congress, governments generally and the people regarding their respective rights and duties. 4 cr.

#509. Bureaucracy in America
Growth and development of the bureaucratic state. Roles and powers of administrative officials, decision making in bureaucratic settings, citizen participation, and the influence of interest groups on bureaucratic policy making. 4 cr.

#510. Mass Media in American Politics
Contemporary review of media in politics; major roles of media today in providing news, setting public agenda, influencing public opinion; government regulations vs. media responsibility; future developments and consequences for American democracy. 4 cr.

512. Public Opinion in American Politics
Relationship of mass and elite opinion within the context of American political culture. Impact of public opinion on American governmental policies, especially with respect to major issues facing the President and Congress. Appraisal of responsiveness to influence and responsibility to lead. 4 cr.

513. Civil Rights and Liberties
Analysis of three major areas of constitutional rights and liberties—political freedom, equal protection of the laws, and due process—with particular attention to their impact on such problems as political protest, discrimination, school segregation and busing, and student rights. 4 cr.

600. Selected Topics in American Politics
Special topics such as politics and public affairs in New Hampshire, the press and the media in America, women in politics, and civil liberties. See department listings for semester offerings. 4 cr.

701. The Courts and Public Policy
Impact of judicial decisions on public policy at federal, state, local, and regional levels. 4 cr.

702. Public Planning and Budgeting
Analysis, goal setting, and strategic planning in a governmental setting, with particular emphasis on budgetary processes as a means for controlling policy effectiveness. 4 cr.

703. Urban and Metropolitan Politics
Planning and management of the urban community, intergovernment relations, administrative functions, and general urban problems. 4 cr.

704. Policy and Program Evaluation
Policy and program evaluation of federal, state, and local governmental enterprise; focuses on the politics, practices, and methods of evaluative investigation. Evaluation as a technique for providing rational information for budgetary and policy-making decisions. 4 cr.

797, 798. Section B: Seminar in American Politics
Advanced analysis and individual research. Prereq: senior standing. 4 cr.

797, 798. Section F: Seminar in Public Administration
Advanced analysis and individual research, including opportunities for direct observation of governmental administration. Prereq: senior standing. 4 cr.

Comparative Politics

544. Dictatorship and Totalitarianism
Political systems of Nazi Germany, Fascist Italy, Stalinist Russia, and Maoist China; the movements that gave rise to them and their significance for understanding political behavior. 4 cr.

550. Major Foreign Governments
Concepts for comparing and contrasting modern political systems. Ideologies, political movements, and various forms of the modern state; different models of development and modernization. Examples from Western-style democracies, communist systems, and the developing countries of the third world. 4 cr.

552. Contemporary European Politics
Politics and governments in Western Europe, with attention to both basic characteristics of political life in different countries and current issues of politics. 4 cr.

553. Third World Politics
Third world politics in selected states of Africa, Latin America, and elsewhere. Issues and concepts of political change and development. 4 cr.

554. Politics of Central America, Mexico, and the Caribbean
Politics and development in Central America, Mexico, and the Caribbean; political conflict in Central America, Cuba's revolutionary experience, and Mexico's lingering authoritarian politics. 4 cr.

555. Politics in Russia and the New States
Background, structure, leadership, and underlying issues of the Soviet political system. Ideological bases, political history, and contemporary trends. 4 cr.

#556. Politics in China
Historical development, structure, ideological bases, and underlying contemporary issues of the Chinese political system; influence of ideology and the role of Maoism. 4 cr.

#557. Politics in Japan and Southeast Asia
Major noncommunist governments in East Asia; parties and policy making in Japan and other states such as Malaysia, Thailand, Indonesia, and the Philippines. 4 cr.

#558. Government and Politics of Canada
Cultural background of party competition, role of ideology, structure of government, and contemporary issues in Canadian political system. Special fee. 4 cr.

559. The Politics of South America
Politics and development of South American nations and the experiences of populism, reform, insurgency, military authoritarian rule, and the breakdown of democratic norms along with the current process of political liberalization in the region. 4 cr.

651. Selected Topics in Comparative Politics
Specialized areas or issues such as regional politics, national politics, judicial systems, administrative law, constitutions, etc. See department listing for semester offerings. 4 cr.

743. Comparative Political Economy
Exploration of the origins, development, and functions of the modern state in the West, its links with markets and Capitalism, and its role in contemporary political economy. Examples from various advanced industrial societies. 4 cr.

797, 798. Section C: Seminar in Comparative Politics
Advanced analysis and individual research on foreign nations or regions, focusing on governmental institutions, foreign policy, political parties, or bureaucracy. Prereq: senior standing. 4 cr.

International Politics

560. World Politics
Issues and structures that shape contemporary international politics, including rise of the nation-state system, conflict and its resolution, and problems of national interest and choice between nations. Special fee. 4 cr.

561. American Foreign Policy
Constitutional, institutional, political, and societal factors that influence the formulation and execution of U.S. foreign policy. Special fee. 4 cr.

562. Strategy and National Security Policy
Defense and deterrence among the major powers, including the impact of modern weapons on war and arms limitations, the military as a profession, and the role of the armed forces in shaping defense policy. 4 cr.

#563. Foreign Policies of Europe
East-West relations, security alliances, economics and political cooperation, and impact of domestic changes and superpower relationships upon the international politics of Europe. 4 cr.

564. Russia in World Affairs
Background and contemporary perspectives of the Soviet role in international politics. Particular emphasis on issues in international communism, Soviet-American relations, Soviet arms development, and Sino-Soviet relations. 4 cr.

565. United States-Latin American Relations
Contemporary political, economic, and social relations between the U.S. and Latin America. Topics include the pattern of U.S. response to political change in Latin America, regional cooperation, debt, trade investment, the drug trade, immigration, rising interdependence, and prospects for economic integration. 4 cr.

566. Foreign Policies of Asia and the Pacific
Current foreign and defense policies as they affect the Pacific region. International politics of China, Japan, and selected Southeast Asian nations, including their efforts at cooperation. 4 cr.

567. Politics of Global Resources
Examines international politics from the perspective of the exhaustability of global resources and the expansion of global demand. Concentrates on issues including population, food, energy, the environment, security, and human rights. Explores the role of surrounding political setting, the rise of global interdependence, and the appearance of new institutional frameworks to deal with the new problems. Looks at the emerging process of global public policymaking. 4 cr.

568. Introduction to Intelligence
Introduction to the purpose and practice of intelligence in the national security process. Concentration on the role of intelligence in the United States involving the C.I.A., military intelligence agencies, and related institutions. Includes comparative examination of the role of national strategic intelligence and the practice of intelligence in other countries. 4 cr.

660. Selected Topics in International Politics
Specialized areas or issues in international relations such as conflict resolution and disarmament, European perspectives on American politics, contemporary diplomatic practices, seapower, and defense. 4 cr.

#760. Theories of International Politics and Integration
General explanations of the behavior of nations; theory and practice of supra-national integration; theories of peace and security and community building at the international level; concepts and experience in arms limitations and conflict resolution. 4 cr.

761. International Law
Formalized processes for regularizing state behavior; development of norms based on custom, precedent, and formal institutions, as in treaties and cases. Arms reduction and limitation arrangements; inspection, and other formal procedures designed to preserve peace. 4 cr.

762. Politics of International Trade and Development
Explores the postwar global trade system, against the background of calls for increased protectionism. Emphasis given both to domestic as well as to international political considerations. 4 cr.

778. International Organization
Collective security and other forms of cooperation among nations through international organizations such as the United Nations and its predecessors, and through regional bodies. Special fee. 4 cr.

#797, 798. Section E: Seminar in International Politics
Advanced analysis and individual research; emphasis on developments in theory. Prereq: senior standing. 4 cr.

Political Thought

520. Justice and the Political Community
Origin of the idea of justice, relationship between politics, justice, and morality; selections from Plato, Aristotle, Roman, Islamic, and Christian political philosophers. 4 cr.

521. Rights and the Political Community
Human rights and the quality of communities as expressed in Hobbes, Locke, Mandeville, Rousseau, and others. 4 cr.

522. Dissent and the Political Community
Current political ideologies and controversies in America and abroad; liberal democracy and its critics since the 19th century. 4 cr.

523. American Political Thought
American political thinkers and observers of American politics; the founding of the Republic; problems and tensions reflected in the writings of Calhoun, Thoreau, Lincoln, de Tocqueville, and others; relations between liberty and authority, democracy and stability, capitalism and alienation. 4 cr.

524. Politics and Literature
Classical and contemporary works of literature to illustrate perennial issues in political philosophy; among authors studied are Aristophanes, Sophocles, Shakespeare, Melville, Tolstoy, and Sartre. 4 cr.

620. Selected Topics in Political Thought
Selected issues in political theory, such as liberalism and conservatism, radical political thought, the American political character, and others. See department listings for semester offerings. 4 cr.

720. Perspectives on Political Science
Different views on the study and meaning of politics. Perspectives of political scientists, political philosophers, and political activists. 4 cr.

797, 798. Section I: Seminar in Political Thought
Advanced treatment and individual research. Prereq: senior or graduate standing. 4 cr.

Internships, Advanced Studies, and Honors Thesis

602A, B. Internship in Political Science
Field experience in a governmental or nongovernmental organization at the local, state, national, or international level. Arrangements should be made through the political science department. Open to juniors or seniors with at least a 3.00 G.P.A. Permission of the Undergraduate Program Committee of the department is required prior to the internship. From 4 to 16 credits may be taken; however, only 4 credits may be for a grade. The rest will be credit/fail, and only 4 credits may be applied to the political science major. May be taken in conjunction with Advanced Study in Political Science. (602A: Variable 4–12 cr. Cr/F; 602B: 4 cr. Letter grade.)

795, 796. Advanced Study in Political Science
Senior POLT majors, with a cumulative average of 3.20 or greater, may undertake advanced study (political science), in an area of their choice, in consultation with member(s) of the faculty. Normally, the result of the project will be a significant written product of a quality comparable to that done at the 700 course level. Students must initiate the project discussion

and obtain approval of the Undergraduate Program Committee of the department before undertaking the project. The advanced study project will constitute the tenth course in the major, and the department will recognize the completion of advanced study by recognizing the student as having completed the major "with distinction." 4 cr.

799. Honors Thesis
Senior POLT majors, with a cumulative average of 3.20 or greater, may undertake a special honors project in an area of their choice. The results of this special project will be a significant written product constituting an honors thesis, under the supervision of a faculty sponsor. Students must initiate the project discussion and obtain the approval of the Undergraduate Program Committee before undertaking the project. The honors thesis will constitute the tenth course in the major. 4 cr.

Portuguese (PORT)

Department of Spanish and Classics
(For faculty listing, see page 184.)

401-402. Elementary Portuguese
For students without previous knowledge of Portuguese. Aural-oral practice; fundamental speech patterns; reading and writing to achieve a firm basis for an active command of the language. Labs. No credit toward a major. (No credit for students who have had two or more years of Portuguese in secondary school; however, any such students whose studies of Portuguese have been interrupted for a significant period of time should consult the chairperson about possibly receiving credit.) 4 cr.

503-504. Intermediate Portuguese
Conversation and composition based on readings in contemporary Portuguese and Brazilian literature, especially theatre, which is closest to conventional language. A traditional grammar text supplements reading. Lab. 4 cr.

Psychology (PSYC)

(For program description, see page 35.)

Chairperson: Victor A. Benassi
Professors: William M. Baum, Victor A. Benassi, Peter S. Fernald, Kenneth Fuld, John A. Nevin
Associate Professors: Ellen S. Cohn, Earl C. Hagstrom, John E. Limber, Robert G. Mair, John D. Mayer, Kathleen McCartney, Carolyn J. Mebert, Edward J. O'Brien, William Stine, Rebecca M. Warner, Daniel C. Williams, William R. Woodward
Assistant Professors: Billy E. Peterson, Elizabeth L. Stine
Lecturers: Richard I. Kushner, Peter Yarensky
Academic Counselor: Janice Chadwick

The listings that follow are general descriptions of the courses. Students are referred to the Instructors' Course Descriptions published by the department each semester for specific details about each section. Listings will be made available in departmental offices during the preregistration period.

PSYC 401 is a prerequisite for all courses in the psychology department except PSYC 402, 571, and 770.

PSYC 402 is a prerequisite for all 700-level psychology courses except 770 and 771.

General Course

401. Introduction to Psychology
Psychology as a behavioral science; its theoretical and applied aspects. Coverage of basic topics in the field, including developmental, learning, personality, abnormal, social, perceptual/sensory, and physiological psychology. To experience actively the nature of psychological research, students have an opportunity to participate in a variety of studies as part of a laboratory experience. 4 cr.

Major Courses

402. Statistics in Psychology
Design, statistical analysis, and decision making in psychological research. Substantive problems as illustrations of typical applications and underlying logic. No credit for students who have completed DS 420, MATH 644, RECO 528, or SOC 502. Special fee. 4 cr.

502. Research Methods in Psychology
Research design, including experimental and correlation design; internal versus external validity; measurement; writing a research report; graphic and statistical methods for summarizing data; sampling; and special problems such as experimenter effects, reactivity of measurement, and others. The use of hypothesis testing and data analysis in research. Prereq: PSYC 401 and 402. Special fee. 4 cr.

512. Psychology of Primates
A comparative analysis of primate cognitive, linguistic, and social processes. The origins of human behavior will be explored from the perspectives of history, evolution, and contemporary work in neuropsychology, linguistics, sociobiology, and related fields. Prereq: PSYC 401. 4 cr.

513. Cognitive Psychology
The study of human cognition, its basic concepts, methods, and major findings. Human knowledge acquisition and use. Attention; perception; memory; imagery; language; reading; problem solving; and decision making. Prereq: PSYC 401. 4 cr.

521. Behavior Analysis and Its Applications
Principles developed from experimental study of human and animal learning; their theoretical integration; their application to the understanding of human behavior. Procedures for changing behavior in practical situations, related to theories of learning. Prereq: PSYC 401. 4 cr.

522. Behaviorism
Introduction to behaviorism as a philosophy of science. Some historical background, but concentration on modern behaviorism as exemplified in the works of B. F. Skinner. Prereq: PSYC 401. 4 cr.

531. Psychobiology
The human as a biological machine; advantages and limits of such an approach for studying behavior. Perception, language, and thought; learning and memory; emotions from the point of view of physiology. Prereq: PSYC 401. 4 cr.

552. Social Psychology
Behavior of individuals as affected by other individuals, groups, and society. Topics include attitude change and social influence, conformity, social interaction, interpersonal attraction, impression formation, research. Prereq: PSYC 401. 4 cr.

553. Personality
Major theories, methods of assessment, and research. Prereq: PSYC 401. 4 cr.

561. Abnormal Behavior
Causes, diagnosis, and treatment of abnormal behavior. Implications of varying theoretical viewpoints. Prereq: PSYC 401. 4 cr.

571. The Great Psychologists
Historical introduction to some of the great psychologists and their classic works. 4 cr.

581. Child Development
The developing child in the context of his/her society. Current problems in and influences on development of the child. Personality and cognitive development; exceptional children. Prereq: PSYC 401. 4 cr.

582. Adult Development and Aging
A life-span developmental framework for the study of growth, decline, and stability on adult development. Developmental methods in adult development research; biological basis for aging; patterns of change and stability in diverse domains of psychological functioning, e.g., perception, cognition, intellectual performance, and personality organization. Prereq: PSYC 401. 4 cr.

702. Advanced Statistics and Research Methodology
Experimental design, analysis, and interpretation. Repeated measures, designs, trend analyses, nonparametric analyses, confounding, missing data, interpretation of interactions, and computer processing of data. Intended primarily for majors planning to attend graduate school. Prereq: PSYC 402; 502;/or permission. 4 cr. (Not offered every year.)

704. Research Methods in Social Psychology
Critical examination of the experimental method and nonexperimental alternatives, including survey research, field techniques, and evaluation research. The importance of ethical responsibility, experimental artifacts, and validity issues. Each student responsible for an original research project. Prereq: PSYC 402; 502;/or permission. Special fee. 4 cr.

705. Tests and Measurement
Testing intelligence, creativity, achievement, interests, and personality. Test construction; evaluation; relation to psychological theory, research, and practice. Prereq: PSYC 402; 502;/or permission. 4 cr.

710. Visual Perception
Anatomy, physiology, psychophysics, and perceptual processes of vision. Topics include physics of light, psychophysics, color, space and form, depth, motion, eye movements, visual learning and development, constancy, and illusions. Prereq: PSYC 402; 502; 531;/or permission. Special fee. 4 cr.

711. Sensation and Perception
Anatomy, physiology, psychophysics, and perceptual processes of the visual, auditory, gustatory, olfactory, and cutaneous senses. Topics include stimulus definition, psychophysics, sensory transduction, sensory and perceptual adaptation, neural coding of space, time, magnitude, and quality. Prereq: PSYC 402; 502; 531;/or permission. Special fee. 4 cr.

712. Psychology of Language
Theories of language structure; functions of human language; meaning; relationship of language to other mental processes; language acquisition; indices of language development; speech perception; reading. Prereq: PSYC 402; 502; 512 or 513;/or permission. Special fee. 4 cr.

713. Cognition
Complex mental activities; consciousness and attention; concept formation; reasoning; problem solving; creative thinking; relationship between cognition and affective behavior. Prereq: PSYC 402; 502; 513;/or permission. 4 cr.

721. The Experimental Analysis of Behavior
Environmental and biological determiners of behavior. Theory, research methods, and applications. Major concepts and recent research. Prereq: PSYC 402; 502; 521 or 522;/or permission. Special fee. 4 cr.

723. Behavior Modification and Therapy
Applications of learning and behavior theory to the solution of socially relevant problems, including maladaptive behavior in educational and therapeutic settings. Emphasis on current research and theory. Prereq: PSYC 402; 502; 521, or 522;/or permission. 4 cr.

731. Brain and Behavior
Relationships between the nervous system and behavior. Physiological, neural, and biochemical mechanisms underlying instinct, memory, learning, emotion, and consciousness in humans; evolution of these functions in lower animals. Prereq: PSYC 402; 502; 531;/or permission. Special fee. 4 cr.

732. Evolution, Behavior, and Culture
Behavior from the perspective of evolutionary theory. Comparisons of basic processes, such as learning and social behavior, across species. Current psychological theories of behavior discussed in the light of theories formulated by ethologists and ecologists. Prereq: PSYC 402; 502; 512, 521, or 522;/or permission. Special fee. 4 cr.

752. Advanced Social Psychology
A general survey of current research and major theories. An in-depth critical analysis of selected topics such as attribution theory, social cognition, and theories of aggression. Prereq: PSYC 402; 502; 552;/or permission. 4 cr.

755. Psychology and Law
Applications of psychology to the study of the law, including theories of legal and moral judgment, participants in the legal system (judges, police, victims, witnesses), the trial process, and plea bargaining. Special focus on the death penalty, the insanity plea, and child witnesses. Prereq: PSYC 402; 502;/or permission. 4 cr.

762. Counseling
Theories of counseling; ethical considerations; professional and paraprofessional activities in a variety of work settings. Prereq: PSYC 402; 502; 553 or 561;/or permission. 4 cr.

770. History of Psychology
Survey of the history of psychology up to the 20th century. Major figures, theories, and developments. Relationship to developments in cultural history, philosophy, and the natural sciences. Beginnings of modern scientific psychology. Prereq: PSYC 402; 502;/or 571;/or permission. 4 cr.

771. Psychology in 20th-Century Thought and Society
Reassesses, extends, and integrates knowledge of 20th-century psychology within the historical perspective. Major figures, schools, systems, theories. Social, institutional, and international developments since the 19th century. Review of major fields of psychology. Prereq: PSYC 402; 502;/or 571;/or permission. 4 cr.

780. Prenatal Development and Infancy
Psychological development of infants from conception through second year of life. Factors and potential influences on reproductive health and prenatal physical and behavioral development. Transition to parenthood, infant temperament and parent-infant relationships. Developmental patterns of specific capabilities. Prereq: PSYC 402; 502; 581 or FS 525;/or permission. 4 cr.

#783. Cognitive Development
Theories of cognitive development. Comparison among major theorists on how knowledge, thought, and development are defined and studied. Current research, including cognitive development; memory; perceptual processes; language. Prereq: PSYC 402; 502; 581;/or permission. 4 cr.

785. Social Development
Examines development of social interactions. Emphasizes important social relationships for the child (i.e., attachment to parents and friendships with peers). Considers other topics of relevance to social developmentalists, such as temperament, aggression, social cognition, and sex roles. Prereq: PSYC 402; 502; 581;/or permission. 4 cr.

Special Courses

591. Special Topics in Psychology
New or specialized courses are presented under this listing. Staff present material not normally covered in regular course offerings. May repeat but not duplicate content. Prereq: PSYC 401. 4 cr.

741. Advanced Topics
Advanced material in which instructor has specialized knowledge through research and study. May be repeated for different offerings. Topics under this listing may be used to fulfill a major requirement in category 3a. Prereq: PSYC 402; 502;/or permission. 4 cr.

791. Advanced Topics
Advanced material in which instructor has specialized knowledge through research and study. May be repeated for different offerings. Topics under this listing may be used to fulfill a major requirement in category 3b. Prereq: PSYC 402; 502;/or permission. 4 cr.

793. Externship
Supervised practicum in one of several cooperating New Hampshire mental health/rehabilitation facilities. Coursework knowledge applied to meaningful work and team experience. Commitment includes a negotiated number of weekly work hours and weekly seminars. Supervision by institution personnel and the instructor. Course applications accepted beginning in March for fall term and October for spring term. Prereq: permission; PSYC major; PSYC 402; 502; 561; additional psychology courses desirable. A maximum of 4 credits of 793, 794, and 795 combined can count toward the minimum of 36 credits for PSYC major. Up to 8 cr.

#794. Advanced Externship
Supervised advanced practicum experience in cooperating New Hampshire mental health/rehabilitation facilities. Expands and builds on experiences and skills acquired in PSYC 793. Commitment includes a negotiated number of hours of work per week and participation in weekly seminars. Supervision done by institution personnel and instructor. Course applications accepted beginning in October for spring term. Prereq: PSYC 793; permission. Maximum of four credits of 793, 794, and 795 combined can count toward the minimum of 36 credits for PSYC major. Up to 8 cr.

795. Independent Study
A) Physiological; B) Perception; C) History and Theory; D) Learning; E) Social; F) Cognition; G) Statistics and Methods; H) Experimental; I) Personality; J) Developmental; K) Counseling; L) Psychotherapy; M) Research Apprenticeship; N) Teaching of Psychology (content area to be determined). Specific independent study opportunities are sometimes posted in the psychology offices. Arrangements to be made with a specific faculty member; enrollment by permission only. A maximum of 4 credits of 793, 794, and 795 combined can count toward the minimum of 36 credits for PSYC major. Prereq: PSYC 402; 502;/or permission. 1–4 cr.

797. Senior Honors Tutorial
For senior psychology honors students. Students propose honors theses under the supervi-

sion of psychology faculty. Theses proposed and begun in this course are completed in PSYC 799. Prereq: admission to psychology honors program. 4 cr. (Typically offered in fall.)

799. Senior Honors Thesis
Under supervision of psychology dept. faculty members, students complete the honors projects proposed and begun in PSYC 797. The honors project, which should be empirical in nature, culminates in an oral presentation at the end of the semester. Prereq: admission to psychology honors program; PSYC 797. Special fee. 4 cr. (Typically offered in spring.)

Recreation Management and Policy (RMP)

(For program description, see page 75.)

Chairperson: Lou G. Powell
Associate Professors: Ann L. Morgan, Lou G. Powell
Adjunct Associate Professor: Wendy W. Lull
Assistant Professors: Otis L. Durham, James Hilton, Janet R. Sable
Research Assistant Professor: Linda Aldrich
Adjunct Assistant Professors: Brian E. Doyle, Steven J. Miller
Instructor: Jill Gravink
Adjunct Instructor: Allison C. Turner

400. Impact of Leisure in Society
Critical factors such as self, family, aging, ecology, health, work patterns, communications, cultural diversity, affluence, and changing sex roles are studied in relationship to present and future leisure patterns. Leisure trends are examined through a process of issue analysis spanning social, technological, economic, and political spheres. 4 cr.

490. History and Philosophy of Leisure
Examines the historical and philosophical foundation of recreation and leisure. Emphasizes concepts, theories, and trends that have influenced the change in leisure over time. Prereq: permission required for nonmajors. 4 cr.

501. Recreation Services for Individuals with Disabilities
Presentation and discussion of issues that concern the delivery of quality leisure services to individuals with disabilities in community settings. Lab requirements as well as classroom activities provide opportunities for practical experience. Prereq: permission. Lab. 4 cr.

502. Introduction to Therapeutic Recreation
History and professional concepts of therapeutic recreation and the roles and functions of the therapeutic recreation specialist. 4 cr.

#554. Recreation Business Management
Principles of business management and managerial problem solving as applied to the operation of recreation facilities, parks, and tourist attractions. Emphasizes knowledge in both the public and private sectors: personnel and financial management, market analysis, promotion, and the protection and maintenance of facilities and resources. Prereq: RMP 490 or permission. Lab. 4 cr.

557. Recreation Services Program Design
Introduces the student to a systems approach to program design. Course topics include needs assessment techniques, goal setting and objectives writing, process of group planning, public relations, program evaluation, and leisure education. Applied projects are required. Prereq: RMP 490 or permission. Lab. 4 cr.

558. Program Supervision and Leadership
Emphasis on specific knowledge of leisure activity categories with related organization and leadership techniques. Other topics include facilitation of activity throughout the lifespan and planning for instruction, safety, and crisis confrontation. Applied projects are required. Prereq: RMP 557 or permission. 4 cr.

#560. Campus Recreation Services
Management of college unions and campus recreation resources in higher education. 4 cr.

#561. Introduction to Outdoor Recreation
The history, delivery system, social and economic impacts, and management tools for outdoor recreation. Includes identification of contemporary issues, problems, and opportunities in recreation resource management. Lab. 4 cr.

#570. Community Systems Planning and Development
Evaluation of principal theories of community systems and planning. Topics include problem analysis, methods of community research design, and decision-making skills. 4 cr.

593. Special Topics
A) Camping and Outdoor Education for Individuals with Disabilities; B) State Parks: Their Management and Role; C) Therapeutic Recreation in the School Setting; D) Social Psychology of Leisure; E–Z) Interdisciplinary. Specialized courses covering information not presented in regular course offerings. Description of topics available in department office during preregistration. Prereq: RMP majors or permission. May be repeated but not in duplicate areas. 2–4 cr.

603. Principles of Therapeutic Recreation
Addresses the principles of activity analysis, client leisure assessment, documentation, individualized program planning, and evaluation. Prereq: RMP 490; 502. 4 cr.

604. Clinical Aspects and Techniques in Therapeutic Recreation
Addresses specific clinical knowledge and skills essential to therapeutic recreation service delivery including clinical interviewing, group process, leisure education, and treatment approaches. Prereq: RMP 490; 502; 603. 4 cr.

606. Therapeutic Recreation Practices and Procedures
Introduction to and utilization of mobility techniques in clinical settings. Application of activity and task analysis to selected leisure activities with a variety of populations. Creation of and use of assistive technology and adaptive recreation devices appropriate to specific disabilities. Knowledge and utilization of leadership and group process strategies. Prereq: RMP 490; 502; 603. Special fee. 2 cr. Cr/F.

654. Professional Development, Issues, and Ethics
Issues related to applied professional practice. Investigates professional work environment concerns, including value congruence, ethics, credentialing, networking, and time management. Also prepares students for the internship experience through the identification of career goals and the selection of an approved internship site. Prereq: RMP major; permission. 1–4 cr.

663. Management and Policy in Leisure Services
Comparative analysis of administrative processes within various organizations as well as the political and policy-making roles of managers in the private and public sectors. Emphasis on organizational development, fiscal management, and budgeting as tools used in formulating and implementing policy. Prereq: RMP 557 or permission. 4 cr.

664. Internship
A) Internship in Recreation Management; B) Internship in Therapeutic Recreation. Students enroll in the section corresponding to their major option after receiving approval from the academic adviser. Supervised work experience in an approved profession-related agency. An IA grade (yearlong course) may be assigned at the end of the semester or summer session. Prereq: majors only; permission. Special fee. 2–6 cr. Cr/F.

665. Information Retrieval and Communication in Leisure Services
Prepares students to respond effectively to an information-based society. Course topics are applied to the leisure service delivery systems and include microcomputer systems and applications; standardized information systems; networking; understanding and disseminating descriptive research; and dissemination of information through audio-visual and mass media. Prereq: RMP 557 or permission. 4 cr.

667. Recreation Resource Planning
Overview of site-planning techniques and issues as currently practiced by recreation resource agencies at local, state, and national levels. Relationships of planning to management, policy, and practice; current trends in planning and likely future directions. Extensive use of field trips, to enable students to learn how to read landscapes in order to use natural features in design as well as to enhance visitor experiences. Prereq: RMP 490; RMP major or permission. 4 cr.

711. Recreation Resource Management
Examines the supply and demand of natural resources for outdoor recreation uses, with emphasis on relationships between public and private roles and responsibilities. Social, environmental, and economic impacts of outdoor recreation use are discussed. Current principles and techniques of recreation resource planning

and management are outlined. Prereq: seniors or permission. 4 cr.

724. Grantsmanship, Evaluation, and Research
Emphasis on understanding and application of grantsmanship, research techniques, and research writing. Addresses the process of program planning and grant proposal development. Examines research methodologies and the evaluation processes as applied to recreation and allied health settings. Critical assessment of uses and limitations of research for recreation. Prereq: RMP 490; 557. 4 cr.

743. Environmental Education
Blend of environmental education/interpretation theory, process, and practical application. Includes seminars, workshops, and practical experience in an environmental education program. Prereq: permission. 4 cr.

764. Issues in Leisure Services Management
Issues are presented and discussed as related to applied professional practice. Examination of the commonality in professional experience as well as in-depth investigation of option-specific issues and trends. Students enroll in the course section corresponding to their declared option within the major: A) Program Administration; B) Therapeutic Recreation. Prereq: RMP major; senior; permission. 4 cr.

772. Law and Public Policy in Leisure Services
Topics including the law of torts, contracts, property, civil rights, risk management, and legal research are addressed in the context of leisure services and recreation resources. Public policy and professional advocacy implications are examined in relation to legislative and judicial systems. Prereq: senior RMP major or permission. 4 cr.

#793. Advanced Topics
A) Area and Site Planning; B) Concepts and Trends in Therapeutic Recreation. Topics presented by instructors with specialized knowledge gained through professional practice, research, and study. Description of topics available in department office during preregistration. May be repeated but not in duplicate areas. 4 cr.

796. Independent Study
Individual study and/or research relating to leisure-oriented topics. Prereq: permission. 1–4 cr.

Religious Studies (RS)

(For program description, see page 23.)

Coordinator: Paul T. Brockelman

416. Masterpieces of Eastern Religious Literature and Ideas
Introduction to a number of the great works of religious literature within the primal and Eastern religious traditions, to a variety of methods and perspectives involved in their interpretation, and to the fundamental ideas and attitudes toward life that they express. 4 cr.

417. Masterpieces of Western Religious Literature and Ideas
Introduction to the development and analysis of a number of great works of religious literature within the Western religious tradition, to a variety of methods and perspectives involved in their interpretation, and to the fundamental ideas and attitudes toward life that they express. 4 cr.

599. Special Topics
Studies of particular religious traditions, or periods within those traditions, or special topics and issues of concern within religious studies such as mythology, ritual, mysticism, etc. 4 cr.

#607. The American Character: Religion in American Life and Thought
Interdisciplinary study of the American religious experience and its relationship to other aspects of American culture, taught by a team of three specialists, each in a different discipline: American intellectual and cultural history, American literature, and American church history. Central emphasis on several transforming themes of the 19th century and their effects upon the interplay of religion and society. (Also offered as ENGL 607, HIST 607, and HUMA 607.) 4 cr.

695, 696. Independent Study
Independent study of traditions, topics, or figures within the scope of religious studies. Before registration, student must formulate a project and secure consent of a cooperating department faculty member who will supervise the independent study. 2 or 4 cr.

699. Senior Seminar
A capstone experience intended to help students draw together their various studies in the field of religion. Prereq: any two courses in religious studies and permission. 4 cr.

Reserve Officers Training Corps

(For program description, see page 90.)
(See Aerospace Studies and Military Science.)

Resource Economics (RECO)

Department of Resource Economics and Development
(For program description, see page 49; see also course listings under Community Development.)

Chairperson: Bruce E. Lindsay
Coordinator: Alberto B. Manalo
Professors: Edmund F. Jansen, Jr., Bruce E. Lindsay
Adjunct Professor: George E. Frick
Associate Professors: John M. Halstead, Alberto B. Manalo, Douglas E. Morris
Extension Educators: Michael R. Sciabarrasi, William H. Zweigbaum

411. Resource Economics Perspectives
Microeconomic theory and analysis in resource management and use decisions. Survey of significant resource problems from an economic perspective and the application of economic analysis. Cannot be taken for credit after ECON 402 or equivalent. Special fee. 4 cr.

501. Agricultural and Natural Resource Product Marketing
Structure, organization, and performance of the business section in agriculture, forestry, and other local natural resource-based industries; commodity marketing systems; demand estimation, pricing policies, consumer characteristics, and related topics. Prereq: RECO 411 or equivalent;/or permission. 4 cr. (Offered every other semester.)

504. Business Management for Natural Resource Firms
Planning, operation, and control of natural resource-based firms with direct application to agriculture, aquaculture, forestry, and recreational businesses. Emphasis on decision making, problem solving, and operational strategies. Prereq: RECO 411 or equivalent. Lab. 4 cr.

506. Population, Food, and Resource Use in Developing Countries
Economic, technical, cultural, social, and political factors that influence food supplies, nutrition resource use, employment, and income distribution in the developing countries; the population explosion; strategies for expanding food supplies; social and institutional constraints, strategies and policies for economic development. Prereq: RECO 411 or equivalent. 4 cr.

#512. Gulf of Maine Economic Resources
Topics include fisheries management, oil and gas recovery, and ocean minerals mining. Lab and fieldwork will include opportunity to observe and interview those professionally involved in harvesting marine resources in the Gulf of Maine. Offered as a one-week course at the Shoals Marine Laboratory. Prereq: Intro. econ. course or permission. 1 cr. (Summers only.)

528. Applied Statistics I
Development of elementary statistical techniques through the analysis of prepared data. Continuous and discrete probability distributions; distributions of sample statistics; small-sample theory; regression; correlation; analysis of variance. Permission of instructor required for upper-division students. No credit for students who have completed DS 420, MATH 644, PSYC 402, or SOC 502.

#595, 596. Problems in Natural and Agricultural Resources
Students pursue field, laboratory, or library problems in natural and environmental resources that are not covered by other courses. Faculty consultant and study topic must be cho-

sen before registration. In consultation with the faculty adviser, students select the problem area, create a bibliography for reflection, and pursue the topic. A professionally written paper is expected at termination of the study. May be repeated once for credit. Prereq: permission. 2–4 cr.

#604. Financial Concepts for Natural Resource Firms
Financial decision theory, risk management, investment analysis, financial statement analysis, and asset appraisal techniques with direct application to agricultural and natural resource firms. Prereq: RECO 504. Lab. 4 cr

606. Land Use Economics
Economic and institutional factors affecting human use of land resources; historical discussion of land ownership patterns; supply and demand; production relationships; location and resource use; benefit-cost analysis; institutional restraints and planning for more efficient use of land. Real estate market and taxation. Prereq: RECO 411 or equivalent. 4 cr. (Offered every other semester.)

611. Marine Resource Economics
Economic overview of the marine environment; interactions/conflicts surrounding this multiple-use resource. Economics of fisheries; marine recreation; offshore facilities; aquaculture; waste disposal. Prereq: RECO 411 or ECON 402;/or permission. 4 cr. (Offered every other semester.)

627. Community Economics and Finance
Economic and financial factors affecting community and local government decisions. Emphasis on use of economic theory and analytical techniques to evaluate problems in contemporary New England communities and towns. Prereq: RECO 411 or ECON 402. (Also offered as CD 627.) 4 cr. (Offered every third semester.)

633. Economics of Travel and Tourism
Provides an understanding of both the microeconomic and macroeconomic aspects of travel and tourism. Using economics as a theory base, the course attempts to identify what is significant or special about travel and tourism compared with other activities. Special attention is given to issues such as resource immobility, capacity constraints, seasonality, and consumers' inability to experience the product before purchase. Prereq: TOUR 400. (Also offered as TOUR 633.) 4 cr.

666. Empirical Resource Economics: Methods and Techniques
Integrates the theoretical, experimental, mathematical, and statistical components of resource economics analysis. Includes problem identification, data collection techniques, data management, mathematical and statistical models, and report generation. Methods and techniques discussed in lecture are demonstrated using personal computers. Addresses assumptions required by the models and techniques and their relationship to the theory and analytical results. Prereq: RECO 411; MATH 420; CS 401 (or 495), junior standing and permission. 4 cr.

676. Economics of Water Use and Quality Management
Economics of water use; role of government and policy agencies, water supply and demand, economic impact of water and water quality standards, alternatives in quality management, externalities, and methods of evaluation. Prereq: elementary biological or physical science (or WARM 504); RECO 411. 4 cr. (Offered every third semester.)

701. Statistical Methods I
Analysis of variance and general linear model; measured numbers, nature of statistical evidence, sampling distributions, and principles of statistical inference; application of specific linear models to given sets of data. Prereq: upper-division undergraduate or graduate standing. 4 cr.

704. Economics of Policy Issues in Food and Natural Resource Use
Economic analysis of current issues affecting food and natural resource use, such as food, safety, air and water pollution, land use and conservation, and waste management. Economic, political, and social consequences of alternative policies and programs are evaluated. Prereq: at least one RECO 600-level course or permission. (Not offered every year.)

708. Environmental Economics
Environmental pollution, the market economy, and optimal resource allocation; alternative control procedures; levels of environmental protection and public policy; property right issues. Prereq: Intermed. microecon. theory; permission. 4 cr. (Offered every third semester.)

#710. Resource Economics Seminar
Seminars arranged to students' needs and offered as demand warrants: A) Rural Development; B) Marine Economics; C) Community Economics; D) Land and Water Economics; E) Quantitative Methods; F) Recreation Economics; G) Small Business Economic and Managerial Issues. In-depth treatment of area, including classic works. May be repeated. 2–4 cr.

#715. Linear Programming and Quantitative Models
Solving applied economic problems using linear and nonlinear techniques with emphasis on problem specification and interpretation of model results. Unit of analysis includes individuals, firms, or communities as they address contemporary problems dealing with resource allocation, product distribution, and whole-firm organization. Computer applications on both mainframe and personal computers utilized for managerial decision making. Project required. Prereq: permission. 4 cr. (Offered every other year.)

756. Rural and Regional Economic Development
Concepts and methods of delineating regional economies, methods of measuring activity, regional development, and public policies. Emphasis on empirical research studies. Prereq: intermed. econ. theory or permission. 4 cr. (Offered every third semester.)

795. Investigations in Resource Economics
Special assignments in readings, investigations, or field problems. A) Agricultural Marketing; B) Agricultural Production and Farm Management; C) Community Development; D) Economics of Human Resources; E) Economics of Population and Food; F) Land Economics; G) Marine Economics; H) Rural Economic Development; I) Regional Economics; J) Water Economics. Prereq: permission. May be repeated. Variable 2–4 cr.

799H. Senior Thesis/Honors
Students develop and conduct individual research projects related to applied resource economics under the direction of a senior thesis committee. The resulting written thesis is defended in an oral presentation before departmental faculty and students. Prereq: permission, majors only, senior standing. 4 cr.

Russian (RUSS)

Department of German and Russian
(For program description, see page 36.)

Chairperson: Aleksandra Fleszar
Visiting Professor: Mayumi Morimoto
Associate Professors: Arna Beth Bronstein, Aleksandra Fleszar, Ronald D. Leblanc
Lecturer: Aleksandr I. Glukharev

New students will be assigned to the proper course on the basis of proficiency tests. A student may not receive UNH credit for elementary Russian courses if he or she has had two or more years of secondary school Russian. If a significant number of years have elapsed since completion of the last course, a student may petition the department to take 400-level language courses for credit.

401-402. Elementary Russian
Oral-aural practice and written drills designed to achieve a mastery of basic grammatical patterns. Language lab and computer lab work. For students without previous training in Russian. 4 cr.

425. Introduction to Russia through Literature
Introduction to contemporary Russian society through 20th-century literature. Includes a brief outline of Russian history, history of literature, and the arts prior to 1917. Examines through post-1917 literature and film the "Russian mind" and the "Soviet mind," how they clashed, and how the "Russian mind" is adapting to the recent changes in Russia. 4 cr.

#485. Russian Seminar in the Russian Language and Culture
Four weeks of language, culture, and civilization classes on the intermediate level. Conducted in Russia by Russian instructors. Classes four hours per day, six days per week; field trips. Prereq: RUSS 402 or equivalent; permission. 4 cr. (Summers only.)

502. Review Russian for Intermediate Students
Reviews the complete Russian declensional system, singular and plural, nouns, adjectives, pos-

sessives, and verb system (conjugations, aspectual usage, imperative usage and formation). Students successfully completing this course (with a C or better) should be able to continue their study in RUSS 504. Prereq: RUSS 402 or equivalent; permission. 4 cr.

503-504. Intermediate Russian
Continuation of RUSS 401-402. Review of Russian grammar, and practice in oral and written expression. Prereq: RUSS 402 or equivalent high school or college course with a grade of C or better. 4 cr.

505-506. Russian Conversation and Reading
Designed to increase fluency in Russian conversation and reading. Students are advised to take this as a sequence along with RUSS 503-504. Prereq: RUSS 401-402 or permission. 4 cr.

521. Survey of 19th-Century Russian Literature in English
Selected masterpieces of 19th-century Russian literature. Pushkin, Gogol, Tolstoy, Dostoevsky, Chekhov, and others. Lectures and readings in English. Open to all students, including freshmen. 4 cr.

522. Survey of 20th-Century Russian Literature in English
Selected masterpieces of 20th-century Russian literature. Chekhov, Pasternak, Bely, Bulgakov, Solzhenitsyn, and others. Lectures and readings in English. Open to all students, including freshmen. 4 cr.

#585. Russian Language Seminar in Russia
Five weeks of Russian language classes on all levels conducted in the USSR. four hours per day, six days per week. No prerequisites. 4 cr. (Summers only.)

#586. Russian Language Seminar, Civilization, and Culture in Russia
Five weeks of culture and civilization classes and field trips to museums, art galleries, schools, factories, etc. Conducted in the USSR. Classes and excursions average three hours per day, seven days per week. No prerequisites. 4 cr. (Summers only.)

593. Major Russian Authors in English
In-depth discussion and analysis of major Russian authors or literary periods. A different author or period offered each semester. Lectures and readings in English. Open to all students. Not for major credit; majors must register for RUSS 693. 4 cr.

631-632. Advanced Russian Conversation and Composition
Advanced spoken and written Russian designed to maintain aural-oral fluency; advanced grammar. Prereq: RUSS 503-504 or equivalent. 4 cr.

685, 686. Study Abroad
Studies at a Russian institution of higher learning. Interested students should consult with a Russian adviser. Prereq: primarily for juniors and seniors who have completed RUSS 632 or equivalent with a grade of B (3.00) or better. Variable to 16 cr. Cr/F. (IA grade will be assigned until official transcript is received from the foreign institution.)

691. Readings in Russian Literature
Linguistic and stylistic characteristics of the authors covered in RUSS 521. Readings and lectures entirely in Russian. 4 cr.

692. Drama
Examination of exemplary Russian plays. A play production in Russian emphasizing phonetic articulation, intonation, and fluency and allowing in-depth analysis of a particular text. Special fee. 4 cr. (May be repeated for credit barring duplication of material.)

693. Major Russian Authors
Same as RUSS 593, except that majors may do selected readings in Russian and conduct research assignments on a specified topic. Final project required. 4 cr.

733. Advanced Language and Style
For students who have a strong, active control of grammar. The most difficult problems of Russian grammar and syntax; poetry and prose. Develops confidence in expression both in everyday situations and in abstract concepts (emphasis on the latter). 4 cr.

734. History and Development of the Russian Language
Overview of the changes in sounds, structure, and vocabulary from Proto-Indo-European through Old Church Slavonic, Old Russian, to contemporary Russian. Readings in Old Church Slavonic and Old Russian. 4 cr.

791. Methods of Foreign Language Teaching
Objectives, methods, and techniques in teaching foreign languages from elementary grades through college. Discussion, demonstration, preparation of instructional materials, microteaching of the language skills. Prereq: permission. 4 cr.

795, 796. Independent Study in Russian
Open to highly qualified juniors and seniors. To be elected only with permission of the department chair and the supervising faculty member or members. Barring duplication of subject, may be repeated for credit. 1–4 cr.

797, 798. Special Studies in Russian Language and Literature
Selected topics in language, culture, and literature. 2 or 4 cr.

School of Health and Human Services (HHS)

(For program description, see page 67.)

510. AIDS: Health, Ethics, and Social Agenda
AIDS has become one of the most important health issues of our time. This course explores the medical, policy, financial, and ethical issues raised by society's efforts to respond to this "crisis." (Also offered as INCO 404S.) 4 cr.

540. Statistics for Health and Human Services Professionals
A conceptual and analytical approach to the use of statistics in the health and human service professions. Emphasis on the logic and purpose of statistics. Attention to special problems of statistical design such as random assignment, single subject trials, and the ethics of control groups. Basic computer skills for manipulating data. Students may not register if they have had another stats course. Special fee. 4 cr.

640. Environmental and Occupational Health
Environmental health is the area of human ecology that studies the interrelationship between humans and their environment as it affects the health of the individual or groups. Occupational health examines the workplace as a significant source of discomfort, illness, injury, and death in the population. Traces the evaluation of environmental health across time and across many cultures. 4 cr.

740. Health Promotion Seminar
Examines contemporary health concerns in terms of lifestyle, environmental, and sociocultural dimensions. Focus on theories relating to health behavior and behavioral change. Analyzes risk factors and identifies strategies to reduce risk. Special fee. 4 cr.

798. Special Topics in Health and Human Services
Explores areas related to specific professional health interests. May repeat but not duplicate subject areas. A) Communication Disorders; B) Health Management and Policy; C) Medical Laboratory Science; D) Nursing; E) Occupational Therapy; F) Physical Education; G) Recreation Management and Policy; J) Family Studies; K) Social Work; L) Health Promotion; I, M–Z) Interdisciplinary. Prereq: permission. 1–4 cr.

Social Science (SCSC)

Coordinators for the Social Science Division, College of Liberal Arts, are Jo-Ann Kelly and the chairperson of the Social Science Division.

681. Internships
Fieldwork in a state or local government department, agency, or institution, or in an approved private agency. Work will be under supervision of agency. Department chairperson or representative is responsible for arranging the program. Offered through departments of history, political science, psychology, sociology, and anthropology. Prereq: senior standing. Variable to 16 cr.

682. Washington Internship
Internship placements in Washington, D.C., through the Washington Center. Individual internships arranged with legislative and judicial offices, law firms, public interest organizations; in the arts, the media, labor, international af-

fairs business, consumer affairs. Supervision by agency personnel and faculty sponsor. Students should have above-average academic record before applying. Open to all majors. Applications available in the Whittemore School Undergraduate Programs Office, McConnell Hall. Prereq: junior or senior. Student must also register for a graded, 4-credit independent study in the student's major. Internship credit variable to 12 cr. Cr/F.

Social Work (SW)

(For program description, see page 76.)

Chairperson: Robert E. Jolley
Associate Professor: Robert E. Jolley
Assistant Professor: Sharyn J. Zunz
Instructors: Linda Rene Bergeron, Martha A. Byam, Martha H. Ortmann

524. Introduction to Social Work
The role of social work within agency structures. Programs, policies, social work services studied in historical perspective; their auspices, goals, and operations for consumers from various ethnic, racial, and social groups. Weekly observational participatory assignments at community agencies. 4 cr.

525. Introduction to Social Welfare Policy
U.S. social welfare provisions: income, housing, employment, and health care. Programs and policies in historical perspective: their auspices, goals, and operations for consumers from various social, racial, and ethnic groups. 4 cr.

550. Human Behavior and Social Environment I
Introduction to human behavior and development as it influences and is influenced by multiple factors in the social environment, including individual genetic and biological composition: race, gender, age, socioeconomic status, ethnicity, geographic location, physical appearance, and ability. How these factors operate throughout the life cycle. Provides a knowledge base and perspective to understand a client's behavior, attitude, and values in relation to the attitudes and values of the social work professional and the larger society. 4 cr.

551. Human Behavior and Social Environment II
Continuation of 550. Agents of socialization that most significantly affect individual development and behavior, and a dynamic and changeable concept of social systems as they affect individual and group behavior in relation to the dominant society. Prereq: SW 550; major. 4 cr.

622. Social Work Practice I
Introduction to methods and practice. Basic principles, values, and ethics. Interviewing skills, problem assessment, social contracting. Skills training in lab sessions. Required for majors, should be taken in junior year. Prereq: SW 524 or permission. 4 cr.

623. Social Work Practice II
Continuation of SW 622. Delineation and study of intervention and change strategies differentiated with individuals, groups, and communities. Required for majors. Prereq: SW 622. 4 cr.

633. Seminar in Social Work Methods
Analysis and comparison of change theories, intervention strategies, therapeutic techniques. Seminar format. Possible topics: techniques of group work, casework or community practice, behavior modification, and staff development and supervision. Prereq: senior major standing. 4 cr.

640. Social Welfare Field Experience I
Majors will be placed in a social welfare setting for a minimum of 225 hours; individual arrangements with faculty coordinator. Required for majors. Prereq: SW 622 and permission. Coreq: SW 640A. Special fee. (No credit toward a minor.) 5 cr. Cr/F.

640A. Social Welfare Field Experience I: Seminar
Seminar on campus. Prereq: SW 622 and permission. Coreq: SW 640. (No credit toward a minor.) Special fee. 3 cr.

641. Social Welfare Field Experience II
A continuation of SW 640 with a minimum of 225 hours. Required for majors. Prereq: SW 640 and permission. Coreq: SW 641A. (No credit toward a minor.) 5 cr. Cr/F.

641A. Social Welfare Field Experience II: Seminar
Continuation of 640A. Required of majors. Prereq: SW 623 and permission. Coreq: SW 641. (No credit toward a minor.) 3 cr.

697A–H. Special Topics in Social Welfare
Seminar for advanced majors. Topics may include: A) Alcohol and Alcoholism, B) Drugs and Chemical Dependency, C) Income Maintenance, D) Health Care, E) Child Welfare, F) Aging, G) Mental Health, or H) Developmental Disabilities. May be repeated for different topics. Prereq: permission. 4 cr.

#700. Social Gerontology
Theories, social problems, programmatic responses, and recent research on aging; emphasis on psychosocial forces. Prereq: senior status;/or permission. 4 cr.

701. Women and Aging
Analysis of the major theories about the social conditioning of aging women and its effect in contemporary society. Human service response. Psychosocial, biological, legal, and economic implications. Prereq: senior status or permission. 4 cr.

#705. Child Welfare: Policies, Programs, and Practice
Examination of the major policy and program questions of child welfare with a focus on child care and protection, adoption and foster care, juvenile delinquency, service delivery, and concepts of treatment in public and private programs. Prereq: senior status or permission. 4 cr.

795. Independent Study in Social Service
Independent work under department faculty guidance. Enrollment by permission only through arrangement with specific faculty. May be repeated with a different focus to maximum of 8 cr. Prereq: 12 hours social service coursework; permission. Variable 1–6 cr. Cr/F.

796. Independent Study: Teaching Assistantship
Participating students provide leadership and supervision for small groups of majors in social work practice simulations. Student teaching assistants work closely with, and under the direction of, department faculty. May be repeated to a maximum of 8 cr. Prereq: senior status; 16 hours in social work; and permission. Variable 2 or 4 cr. Cr/F.

797H-798H. Honors Thesis
Working with an assigned faculty adviser, students propose and develop a thesis project for both oral and written presentation before the end of the semester. Prereq for 797H: admission to the SW honors program; permission. Prereq for 798H: satisfactory completion of 797H; permission. Variable credits: 2–4 per semester; 6 cr. maximum for both semesters.

Sociology (SOC)

Department of Sociology and Anthropology
(For program description, see page 36; see also additional course listings under Anthropology.)

Chairperson: Sally Ward
Professors: Melvin T. Bobick, Lawrence C. Hamilton, Bud B. Khleif, Arnold S. Linsky, Stuart Palmer, Murray A. Straus
Associate Professors: Peter Dodge, Michael J. Donnelly, Cynthia M. Duncan, Sally Ward
Assistant Professors: Alberto A. Godenzi, James Tucker, Heather A. Turner
Lecturers: Stephen D. Adair, Priscilla S. Reinertsen

400. Introductory Sociology
Human social and cultural relationships as revealed in customs and institutions. Social theory, methods and techniques of research, and current research findings. 4 cr.

500. Introduction to Social Psychology
Social structure and culture and human behavior. Sociological analysis of behavior in interpersonal relationships, small groups, formal organizations, and other social units. Social psychological issues within various institutions of society. 4 cr.

502. Statistics
Elementary applied statistical techniques; tables, graphs, cross-classifications; central tendency and dispersion; correlation and linear regression; confidence intervals and hypothesis testing. No credit for students who have completed DS 420, MATH 644, PSYC 402, or RECO 528, but petitions for acceptance of such courses to fulfill the sociology major requirement in statistics will be entertained. 4 cr.

515. Introductory Criminology
Scientific study of causes and control of crime.

Indexes, rates, theories of crime and delinquency, police, courts, probation, prison, and parole. 4 cr.

520. The Family
Sociological study of marriage and the family in American society. Following a life-cycle approach, topics include gender roles, communication and conflict, dating and mate selection, work and family economics, the transition to parenthood, middle- and late-life family, divorce, and remarriage. 4 cr.

530. Race and Ethnic Relations
Majority-minority group relations; special attention to nature and results of black-white and ethnic group relations in the United States. 4 cr.

540. Social Problems
Relation of customs and institutions to such social problems as crime, delinquency, alcoholism, physical and mental disease, sexual deviance, poverty, old age, broken families, and racial and religious prejudices. Especially for nonmajors. 4 cr.

570. Sexual Behavior
A comparative approach to questions of the universality and variability of human sexual behavior. Topics include the changing expression of sexuality at various stages of the life cycle, patterns of arousal and response for each sex, the social control of sexuality, and sexual dysfunctions. 4 cr.

#597. Special Topics in Sociology
Occasional or experimental offerings. May be repeated for different topics. Special fee. 4 cr.

599. Critical Analysis in Sociology
Basic skills essential to the study of sociology; development of critical reading of sociological literature through the practice of systematic evaluation of evidence and the process of theory construction; written and oral analysis of sociological classics; use of library resources. To be taken by sociology majors only no later than the junior year. 4 cr.

601. Methods of Social Research
Cross-sectional and longitudinal survey design; direct and indirect measurement techniques; design of field and laboratory experiments; special topics. Prereq: major in sociology or social work; junior or senior standing;/or permission. 4 cr.

611. History of Social Theory
Analysis of the writings of major contributors to the development of sociological theory from Plato to Max Weber. Special emphasis given to works of Marx, Weber, and Durkheim. 4 cr.

612. Contemporary Sociological Theory
Major schools, concepts, and issues in present-day sociological theory. Readings on functionalism, conflict theory, systems theory, critical theory, and hermeneutics. 4 cr.

#620. Studies in Social Psychology
Application of basic concepts of social psychology to a series of studies involving theoretical, methodological, and substantive issues. Prereq: SOC 500. 4 cr.

625. Female, Male, and Society
Critical, cross-cultural study of gender-related behavior in historical as well as contemporary perspective. Draws on anthropological, social-psychological, and sociological literature. (Also offered as ANTH 625.) 4 cr.

629. Small Groups
Interaction among individuals in small groups and between small groups; perception, attitude, and behavior. Analytical techniques are applied. Prior course in social psychology recommended. 4 cr.

#635. Medical Sociology: Organization and Processes of Modern Medicine
Interrelationship of health, medicine, and society; the social construction of wellness, illness, and healing; age, sex, class, and ethnicity in medical care; institutional networks and the social control functions of medicine; roles and relations of physicians, patients, nurses, and other health workers; medicine in a cross-national context. 4 cr.

#642. Introduction to Social Policy
Definition of social policy. Role of the social scientist in social policy research. Sociological research for policy decisions. Research examples in specific policy areas. Utilization of sociological research in policy decisions. 4 cr.

645. Class, Status, and Power
Pattern of distribution of economic, honorific, and political variables within the populations of complex societies; allocation of personnel to the roles in question, notably through occupational mobility; and the impact of such processes upon behavior, both individual and social. Prereq: SOC 400. 4 cr.

655. Sociology of Crime and Justice
Seminar devoted to analyses of the relationships between violent, property, and "victimless" crime on the one hand and the police, judicial, and correctional components of criminal justice systems on the other. Prereq: SOC 515 or permission; seniors only. 4 cr.

660. Rural-Urban Sociology
Application of sociological and social-psychological principles to the study of populations at various points on the rural-urban continuum. 4 cr.

697. Special Topics in Sociology
Occasional or experimental offerings. Prereq: permission. May be repeated for different topics. 4 cr.

699. Senior Thesis
Independent work in the library or field; recommended for, but not confined to, majors intending to pursue graduate studies; required for honors candidates. Contact staff to obtain approval and arrange supervision from two faculty members. Should be initiated by next-to-last semester. 4–8 cr.; in latter case to extend over two semesters.

720. Current Developments in Sociology of the Family
Current topic selected each semester, such as stratification and the family, intrafamily communication, power structure of the family, kinship in modern societies. Critical review of the literature; class or individual research project usually carried out. Prereq: 8 credits of sociology; SOC 520 recommended. 4 cr.

730. Political Sociology
Contemporary issues in political sociology, with emphasis on the relationship between social class structure and political power. Seminar explores various perspectives on the nature and distribution of power, theories of the state, class structure and political participation, and the politics of policy making. 4 cr.

#735. Complex Organizations
Comparative and historical study of the structure and dynamics of complex organizations (business, military, scientific, political, educational, medical) in their various environments: power and social control, structure and technology, size and performance, environments and adaptation. 4 cr.

#740. Culture Change
Various types of society; development of theory. Descriptive studies of institutional as well as theoretical materials selected from the writings of Comte, Marx, Spencer, Durkheim, Spengler, Sorokin, Redfield, and others. 4 cr.

#741. Social Change and Societal Development
Comparative, interdisciplinary approach. Interrelationships among economic, political, and social factors in determining the structure, dynamics, character, and level of development of societies. SOC 740 recommended. 4 cr.

750. Middle East: Issues of Ethnicity, Work, and Identity
Community studies approach to such topics as ethnicity and identity in the interrelationship of language, religion, and corporate membership in a community; ethnic division of labor; work, pluralism, and family networks; mobility and immobility; estates vs. classes. (Also offered as ANTH 750.) 4 cr.

#761. Population Studies
Major population trends including changes in birth and death rates, population characteristics, mobility, migration, world population growth, population problems, and policies of countries at different stages of economic development. Interrelationship of population and society. 4 cr.

#770. Culture, Personality, and Society
A cross-cultural view of the development of personality as emergent from genetic, situational, and sociocultural determinants; analysis of the dynamic interplay of sociocultural and psychological behavior systems. Prereq: prior courses in sociology, anthropology, or psychology. (Also offered as ANTH 770.) 4 cr.

780. Social Conflict
Nature, setting, and initiation of social conflict, its dynamics, and factors affecting its course and outcome. 4 cr.

785. The Study of Work
Understanding society through the structure of work. Case studies, in an ethnographic manner,

of high-status and low-status occupations to provide understanding of social processes and interrelationships in the social structure. 4 cr.

#790. Applied Sociology
(1) Current level of use of sociological knowledge: (2) the advocate, consultant, and researcher roles in applied settings; (3) techniques of applied research; (4) implications of applied sociology, including ethical problems. Each student will focus on a social problem and write a paper covering the above issues. Applied projects where possible. Prereq: SOC 601. 4 cr.

#794. Evaluation of Social Programs
Evaluation research defined: purposes of evaluation; design of evaluation studies; setting of programs; utilization of evaluation results. Examination of case studies of evaluations of social programs. Students are responsible for designing an evaluation study in their chosen substantive area. Prereq: SOC 601. 4 cr.

795, 796. Reading and Research in Sociology
A) Communications; B) Criminology; C) Culture Change; D) Culture and Personality; E) Deviant Behavior; F) Family; G) Population; H) Rural-Urban; I) Social Control; J) Social Differentiation; K) Social Movements; L) Social Psychology; M) Social Research; N) Social Theory. Prereq: 12 credits of sociology or permission. 2–8 cr.

797. Special Topics in Sociology
Occasional or experimental offerings. May be repeated for different topics. 4 cr.

Soil Science (SOIL)

Department of Natural Resources
(For program description, see page 50; for faculty listing, see page 159; see also course listings under Environmental Conservation, Forestry, Natural Resources, Water Resources Management, and Wildlife Management.)

501. Soils and the Environment
Physical, chemical, and biological aspects of soils in the environment. Labs coordinate with lectures. Special fee. Lab. 4 cr.

502. Soil-Plant Relationships
Soils evaluated in terms of requirements for optimal growth of plants. Emphasis on nutrient availability. Soils and world food problems. Special fee. Lab. 4 cr.

601. Field Description of Soils
Description of soils in the field. Application of soils properties to forestry, plant science, and community planning. Strong orientation to fieldwork. Prereq: SOIL 501 or permission. Special fee. Lab. 3 cr

606. High Intensity Soil Mapping
Production of high intensity soil maps using standards of Soil Scientists of Northern New England. One-week field session following spring semester. Prereq: permission. Special fee. 1 cr.

609. Soils and Community Planning
Using a town plan and soils map, students develop reports for multiple urban and rural land use—housing, sewage, recreation, transportation, runoff, etc. USDA soil classification system; Soil Conservation Service rating criteria; New Hampshire soils. Guest lecturers. Prereq: permission. 2 cr.

#620. Topics in Soil Science
One-week short course taught in summer only. Consult Division of Continuing Education or Department of Natural Resources for current offering. 1 cr.

701. National Cooperative Soil Survey Standards
An in-depth look into the National Cooperative Soil Survey under the leadership of the USDA Soil Conservation Service. Emphasizes the objectives and philosophies of the NCSS program, organization, and infrastructure, operations management, and the standards used to carry out this national program. Includes methods of conducting quality control/quality assurance activities and covers the procedure used to establish standards for soil mapping, characterization, and interpretation, as well as standards for styles of information delivery to users of NCSS products. 1 cr. (Can be repeated up to 3 cr.) (Summers only.)

702. Chemistry of Soils
Chemical composition of soil, colloidal phenomena and the exchange and fixation of elements, cation exchange capacity and source of negative charge, inorganic reactions in soil and their effect on soil properties. Prereq: one year college chem. or permission. 3 cr.

703. Chemical Analysis of Soil
Methods of soil chemical analysis. Coreq: SOIL 702. Prereq: SOIL majors or permission. Not available for graduate credit. Lab. Special fee. 2 cr.

704. Soil Genesis and Classification
Processes involved in formation of soils, soil properties as reflectors of genetic processes. Classification systems of soils related to soil genesis and soil landscapes. Lab sessions illustrate concepts by examining soils in the field. Prereq: SOIL 501 or equivalent. Special fee. Lab. 4 cr.

705. Forest Soils
Basic ecological and management perspectives; soil-site quality evaluation; forest land classification and interpretation; forest soil management techniques. Prereq: SOIL 501 or 502 or permission. Special fee. Lab. 4 cr. (Not offered every year.)

706. Soil Mapping
Two-week field course emphasizing the application of USDA Soil Taxonomy to soil and landscape relationships. Students will write soil survey reports and produce soil maps at scales comparable to those used by the USDA Soil Conservation Service Prereq: SOIL 704 or equivalent. Special fee. 2 cr.

708. Soil Physics
Physical properties of soils and how they relate to the movement of water, solutes, and contaminates in saturated and unsaturated soils. Methods of measuring and characterizing soil physical properties. Applications to environmental problems, including land-based disposal systems, hazardous waste site investigation and remediation, and soil-water management. Prereq: basic courses in mathematics, chemistry, and physics or permission. 3 r. (Not offered every year.)

795. Independent Work in Soil Science
A) Soil-Plant Relationships; B) Physics of Soils; C) Chemistry of Soils; D) Soil Classification; E) Forest Soils; F) Soil Microbiology. Prereq: permission. 1–4 cr.

Spanish (SPAN)

Department of Spanish and Classics
(For program description, see page 36; see also course listings under Portuguese.)

Chairperson: Barbara H. Wing
Professors: Richard J. Callan, F. William Forbes, Charles H. Leighton
Associate Professors: Bernadette Komonchak, Phoebe A. Porter, Barbara H. Wing
Assistant Professors: John M. Chaston, William Mejías-López, Magda A. Renoldi-Tocalino
Instructors: Jeanne L. Ellis, Susan M. Riddell, Elisa F. Stoykovich, Monica V. Torregrosa
Lecturer: Nancy C. Modern

New students will be assigned to the proper course on the basis of their scores on the College Board Achievement Test or number of years of previous study. Transfer credit will not be given for elementary-level college courses in foreign languages if a student has had two or more years of the foreign language in secondary school. No student educated in a foreign country or for whom Spanish is the native tongue will be permitted to register for any Spanish course numbered 649 or below, except 601. All courses conducted in Spanish except where noted.

401-402. Elementary Spanish
For students without previous knowledge of Spanish. Aural-oral practice; fundamental speech patterns; reading and writing to achieve a firm basis for an active command of Spanish. Labs. No credit toward a major. (No credit for students who have had two or more years of Spanish in secondary school; however, any such students whose studies of Spanish have been interrupted for a significant period of time should consult the chair about possibly receiving credit.) 4 cr.

#407. Accelerated Spanish
SPAN 401-402 in one semester. Study of fundamental speech patterns, reading, and writing to achieve a firm basis for active command of Spanish. Labs. Previous knowledge of Spanish is not required. (No credit for students who have had two or more years of Spanish in secondary school; students whose studies of Spanish have

been interrupted for a significant period of time should consult the chair about possibly receiving credit.) 8 cr.

501. Review of Spanish
Emphasis on aural-oral practice; review of basic structure; reading and writing to develop active command of the language. Labs. Designed for those whose study of Spanish has been interrupted for a significant amount of time and for those who have had only two years of high school Spanish. 4 cr.

503-504. Intermediate Spanish
Complete literary texts of intellectual worth; review of language structure; oral and written expression of ideas. Discussion and papers in Spanish. Open to students who have passed SPAN 402 with a C (2.00) or better. No credit toward the major. Lab. 4 cr.

525. Spanish Civilization and Culture
Historical, geographical, and artistic expressions of Spanish civilization that have formed the character of contemporary Spanish culture. Readings, slides, films, tapes, and records. Conducted in English. Majors must take either 525 or 526, but both may not be counted for major credit. 4 cr.

526. Latin American Civilization and Culture
Significant historical, geographical, and artistic expressions of pre-Colombian and Latin American civilization. Readings, slides, films, tapes, records. Conducted in English. Majors must take either 525 or 526, but both may not be counted for major credit. 4 cr.

601. Spanish Phonetics
Practical application of fundamental phonetic theory to spoken Spanish. Required of Spanish majors. 4 cr.

621. Spanish and Portuguese Literature in Translation
Major works by principal authors, such as: Camõens, Cervantes, Lope de Vega, Calderón, Eça de Queiroz, Unamuno, Ortega y Gasset, García Lorca, Casona, etc. Readings, discussions, papers in English. Does not count for Spanish major. 4 cr.

622. Latin American and Brazilian Literature in Translation
Major works by principal authors, such as Inca Garcilaso, Díaz del Castillo, Machado de Assís, Borges, Asturias, Neruda, E. Veríssimo, Fuentes, Leñero, Guimarães Rosa, and Jorge Amado. Readings, discussion, papers in English. Does not count toward Spanish major. 4 cr.

631, 632. Advanced Spanish Conversation and Composition
To maintain and perfect written and spoken Spanish through intensive classroom work, individual conferences, and laboratory sessions. Prereq: A grade of C (2.00) or better in SPAN 504 or equivalent. 4 cr.

One course from SPAN 650, 651, 652, 653, 654 (or an equivalent course) is prerequisite to all higher literature courses in Spanish.

650. Introduction to Critical Analysis
Methods and practice of literary criticism. Critical analysis of representative essays, fiction, poetry, and drama from Spain and Latin America. Frequent short papers. Required of Spanish majors; should be taken concurrently with or immediately following Spanish 632. 4 cr.

651, 652. Introduction to Spanish Literature and Thought
Reading and analysis of major works within the historical, cultural, and social background of the Iberian peninsula. Papers, discussion, and examinations in Spanish. Prereq: SPAN 631, 632. May be taken concurrently with SPAN 632 with permission of adviser. 4 cr.

653, 654. Introduction to Latin American Literature and Thought
Reading and analysis of major works within the historical, cultural, and social background of the New World. Papers, discussion, and examinations in Spanish. Prereq: SPAN 631, 632. May be taken concurrently with SPAN 632 with permission of adviser. 4 cr.

685, 686. Study Abroad
Studies at a Spanish or Latin American university. Prereq: primarily for juniors and seniors who have passed SPAN 503-504 or equivalent with grade of B (3.00) or better. Noncredit orientation meetings required during semester prior to departure. Interested students should consult with the program directors. Special fee. Variable to 16 cr. Cr/F. (An IA grade will be assigned until official transcript is received from the foreign institution.)

#691, 692. Readings in Current Periodicals
Advanced practice in reading, speaking, and writing, based on current events in contemporary periodicals of the Spanish-speaking world. Co- or prereq: SPAN 632 or equivalent. May be repeated. 2 cr.

#733. History of the Spanish Language
Evolution of the Spanish language from the period of origins to the present. 4 cr.

#752. Drama and Poetry of the Siglo de Oro
Social and historical background of the baroque period. Representative plays of Lope de Vega, Tirso de Molina, Calderón; lyric poetry of Lope, Góngora, and Quevedo; prose developments. Prereq: SPAN 652 or 654 or equivalent. 4 cr. (Not offered every year.)

754. The Age of Cervantes
Study of the major works of Cervantes and his contemporaries in the context of the historical, literary, and social currents of the times. Prereq: SPAN 652 or 654 or equivalent. 4 cr. (Not offered every year.)

#755. Literature of the 19th Century
Larra, Espronceda, Bécquer, Pérez Galdós, and Blasco Ibáñez. Romanticism, realism, and naturalism. Prereq: SPAN 652 or 654 or equivalent. 4 cr. (Not offered every year.)

756. Modern Spanish Poetry
Study of selected Spanish poets of the 18th, 19th, and 20th centuries in the context of historical, literary, and social currents of the time. Prereq: SPAN 652, 654, or equivalent. 4 cr. (Not offered every year.)

757. Spanish Drama of the 20th Century
Study of selected Spanish dramatic works of the 20th century in the context of the historical, literary, and social currents of the times. Prereq: SPAN 652, 654, or equivalent. 4 cr. (Not offered every year.)

758. Spanish Prose of the 20th Century
Novels, short stories, and essays. Unamuno, Baroja, Menéndez Pidal, Ortega y Gasset, Julián Marías, Aranguren, Pérez de Ayala, Gironella, and Cela; survey of contemporary prose. Prereq: SPAN 652, 654, or equivalent. 4 cr. (Not offered every year.)

#760. Unamuno and Ortega y Gasset
Philosophical ideology and literary content of major contributions of Miguel de Unamuno and Jose Ortega y Gasset. Prereq: SPAN 652, 654, or equivalent;/or permission. 4 cr. (Not offered every year.)

771. Latin American Drama
From pre-Hispanic origins to the present, modern playwrights of Mexico and Puerto Rico. Prereq: SPAN 652, 654, or equivalent. 4 cr. (Not offered every year.)

#772. Latin American Novel
Development from romanticism to the present; contemporary trends and techniques. Prereq: SPAN 652, 654, or equivalent. 4 cr. (Not offered every year.)

773. Latin American Short Story
Representative authors; stress on 20th century. Principles of interpretation. Prereq: SPAN 652, 654, or equivalent. 4 cr. (Not offered every year.)

774. Major Latin American Authors
Works and lives of selected writers; pertinent historical circumstances. Prereq: SPAN 652, 654, or equivalent. 4 cr. (Not offered every year.)

790. Grammatical Structure of Spanish
Overview of the grammatical structure of Spanish through in-depth analysis of both morphology and syntax, with emphasis on the meaningful contrasts within the Spanish language and the grammatical contrasts between Spanish and English. 4 cr.

791. Methods of Foreign Language Teaching
Objectives, methods, and techniques in teaching foreign languages from elementary grades through college. Discussion, demonstration, preparation of instructional materials, microteaching of the language skills. Prereq: permission. 4 cr.

795. Independent Study
Guided individual study with training in bibliography and organization of materials. Topics selected by instructor and student in conference. Barring duplication of content, may be repeated for credit. Prereq: permission of major supervisor. 1–4 cr.

797. Special Studies in Spanish Language and Literature
A) History of the Spanish Language; B) Medieval Spanish Literature; C) Spanish Literature of the Renaissance; D) Spanish Literature of the Golden Age; E) Spanish Literature of the 18th and 19th Centuries; F) Spanish Literature of the 20th Century; G) Contemporary Spanish Literature; I) Latin American Literature of the 16th and 17th Centuries; J) Latin American Literature of the 18th and 19th Centuries; K) Latin American Literature of the 20th Century; M) Contemporary Latin American Literature; N) Structural and Applied Linguistics; O) Spanish Literary Criticism; P) Latin American Essay; Q) Latin America; S) Spanish Theatre; T) Spanish Poetry; U) Latin American Poetry; V) Galdós; W) Archetype Latin American Literature; X) Special Teaching Problems; Y) Spanish Civilization and Culture; Z) Latin American Civilization and Culture. Specialized courses covering topics not normally presented in regular course offerings. Prereq: permission of major supervisor. 4 cr.

798. Special Studies in Spanish Language and Literature
A) Historic Minorities of the United States; B) Portuguese; C) Hispanic Film; D) Introduction to Hispanic Linguistics; E) Hispanic Dialectology; F) Other. Specialized courses covering topics not normally presented in regular course offerings. Barring duplication of content, topic F may be repeated for credit. Prereq: permission of major supervisor. 4 cr.

799. Senior Honors
For senior Spanish majors with a minimum cumulative grade-point average of 3.20 and the same or better average in the major who want to undertake a special honors project in an area of Spanish language or literature of their choice. Prereq: permission. 4 cr.

Technology (TECH)

Otis J. Sproul, Dean

The following courses are not necessarily offered every year.

101. Introduction to CEPS
Introduces the fields of study in the College of Engineering and Physical Sciences. Development of essential study skills. Open to CEPS students only. 0 cr.

564. Fundamentals of CADD/CAE/CIM
Fundamentals of CADD/CAE/CIM; graphics workstation techniques and principles. Topics covered include display functions, graphics construction techniques, entity manipulation, symbol libraries, variational geometry, and solids modeling. Prereq: permission. 3 cr.

583. Technology: Cultural Aspects
Study of the requirements, limitations, benefits, and hazards that are constraints on the development of technological systems. Prereq: prior courses in physics or chemistry at high school level; sophomore or higher standing at UNH; not open to CHE, CIE, EE, or ME majors; permission. 4 cr.

685. Budapest Program
Enables students to pursue a semester of study at the Technical University of Budapest. For information, contact the Dean's Office, College of Engineering and Physical Sciences, 0–16 cr. Cr/F.

696. Independent Study
Open to qualified students pursuing studies that do not fall within existing departmental areas. 1–4 cr.

797. Undergraduate Ocean Research Program
Students work as members of interdisciplinary project teams on contemporary ocean-related problems under the guidance of a faculty adviser. Student team defines problem, prepares a budget, conducts literature surveys, engages in dialogue with experts in the ocean community, deals with vendors, designs and builds a working engineering model, gathers and analyzes scientific data or conducts a comprehensive study, makes interim reports, and defends the results before a jury of experts. Prereq: normally senior standing and permission of the program director. A yearlong effort: 2 credits each semester, 4 credits total, an IA grade given at the end of the first semester. 4 cr.

Theatre (THEA)

Department of Theatre and Dance
(For program description, see page 36; see also course listings under Communication and Dance.)

Chairperson: Carol Lucha-Burns
Professors: John C. Edwards, Carol Lucha-Burns
Associate Professors: Gilbert B. Davenport, David M. Richman, Charles L. Robertson
Assistant Professors: Susan Jonas, H. Gay Nardone, David L. Ramsey
Faculty-in-Residence, Assistant Professors: Peggy Rae Johnson, Nancy J. Steele
Faculty-in-Residence, Instructor: Carol J. Fisher
Lecturers: Ruth Grossen, Paul M. Mroczka

435. Introduction to Theatre
Introduces all aspects of theatrical production: playwriting, acting, directing, design, technical theatre and construction, and theatre management. Cultural and social context of theatre in our time and through the ages. Introduces major classical and modern types of theatre. Selected plays are read and discussed, and attendance at theatrical production is required. Special fee. 4 cr.

436. History of Theatre I
History and theory in its social framework from the beginnings to 1700. 4 cr.

438. History of Theatre II
1700 to present. 4 cr.

441. Exploring Theatrical Process
Develops the idea that drama is the revelation of character through action. Students explore the myriad connections between theatre and the life it imitates, concentrating on gesture, movement, speech, and other forms of behavior as manifestations of character on and off the stage. Diverse approaches are used to examine in depth the verbal and nonverbal revelations of human personality. (Also offered as DANC 441.) 4 cr.

450. History of Musical Theatre in America
Study of the development of the musical and its relationship to American social history. Special fee. 4 cr.

457. Oral Interpretation
Analysis of literature for performance; demonstration and experimentation with performance methods; development of a critical standard for evaluation of performance and literature. (Not open to seniors.) 4 cr.

458. Costume Construction
Study and development of costuming techniques, including hand and machine sewing, pattern drafting, alterations, and fabric manipulation. Emphasis on demonstrated understanding. 4 cr.

459. Stagecraft
Stage scenery construction and painting. Properties, sound, and backstage organization. Survey of costumes and lighting. Practical application in University Theatre productions. (Not open to seniors.) 4 cr.

475. Stage Makeup
Fundamentals of juvenile, old age, character, and special stage makeup techniques. 2 cr.

520. Creative Drama
Drama techniques leading to the design and execution of drama sessions with children. Includes role-playing, improvisation, and story dramatization. Lab. 4 cr.

#541. Arts Administration
Contemporary arts administration; theories and techniques of cultural resource development, organization, structure, labor relations, marketing, consumer behavior, public relations, fund raising, audience development, and long-range planning. 4 cr.

546. Costume Design for the Theatre
Emphasizes design process, historical research, history of costume and style, color theory, and rendering techniques. Class projects are selected to support the development of the dramatic imagination and critical standards. Projects selected from historical periods in dramatic literature, opera, and dance. In-class time provided for project work. Prereq: permission. 4 cr.

#547. Stage Properties
Research and manufacture of period and modern stage, trim, and hand properties. Prereq: THEA 459. 4 cr.

548. Stage Lighting Design and Execution
Elementary electricity, design theory, instrumentation, control, and practice. 4 cr.

549. Voice and Diction I
Introduces good vocal production focusing on proper support of the speaking voice, appropriate quality and range, and fluency of articulation. Particular reference to theatre, television, and radio—though appropriate for anyone concerned with oral presentations. Individual and group practice sessions. Prereq: majors only. 2 cr.

550. Voice and Diction II
Further development of basic skills for vocal variety and specificity in oral interpretation and theatre. Introduces the International Phonetic Alphabet for analysis of different vocal characterizations and dialect development. Prereq: THEA 549. 2 cr.

551. Acting I
Development of fundamental vocal and physical stage techniques for actors and directors through exercises, improvisation, and theatre games. 4 cr.

552. Acting II
Application of prior training in acting to building characterizations in scenes and short plays. Prereq: THEA 549 and 551. 4 cr. (Open only to THEA majors.)

583. Introduction to Puppetry
Introduces the art of puppetry for general appreciation, entertainment, application in the classroom, and as a therapeutic tool. Emphasis on constructing a variety of puppets (e.g., hand, rod, shadow, and scarf) and adapting literary sources for scripts and performance. (Not open to seniors.) Special fee. 4 cr.

592. Special Topics in Theatre
Special topics, problems, or projects in theatre. Content varies according to needs and interests of students and faculty. Course descriptions are available in department office. May be repeated for credit. 4 cr.

621. Education through Dramatization
Application to educational curricula of drama techniques including sensory awareness, movement, pantomime, storytelling, story dramatization. Includes lesson plan writing. Appropriate for both elementary and secondary education. 4 cr.

622. Storytelling, Story Theatre, and Involvement Dramatics
Students actively develop storytelling techniques based on individual needs. Includes an examination of story theatre and involvement styles and the development of the ensemble. 4 cr.

#624. Musical and Theatre for Youth
Historical examination and analysis. Emphasis on theory and application of playwriting, stage and costume design, acting and directing techniques. Participation in production for youth required. 4 cr.

#627. Methods of Education through Dramatization
Materials and technique practicum using the tools of THEA 520, Creative Drama (storytelling, puppetry, improvisation) to improve classroom teaching. Prereq: permission. 2–4 cr.

632. The Interpretation of Shakespeare in the Theatre
Increases understanding of Shakespeare's language and action, and improves ability to speak his verse and prose with clarity and verve. Students achieve insights into Shakespeare's plays through the medium of performance. Weekly oral and written assignments. Prereq: two of the following three: THEA 457, 549, 551. 4 cr.

652. Scene Design
Stage drafting, modules, materials, design theory, and styles. Individualized exercises, final project. Prereq: THEA 459. 4 cr.

653. Performance Project
Application of prior coursework to a formal theatre production or to an individual performance or teaching project. Substantial written work is factored into the final grade. May be repeated. 2 cr.

654. Scenic Arts Project
Application of prior coursework to a formal theatre production or to an individual performance or teaching project. Substantial written work is factored into the final grade. May be repeated. 2 cr.

655. Musical Theatre Workshop
Introduction to performing and directing the American musical. Discussion and application of beginning audition, acting, and staging techniques. Special fee. Lab. 4 cr.

657. Play Reading
A high-volume reading course which introduces a breadth of modern dramatic literature. American and British alternates annually with European and Russian, all from Brechner, Ibsen, Chekov to the present. Students read 4–5 plays per week and view 1–2 plays on video or film. Lab. Special fee. 4 cr.

689. Theatre/Dance Practicum
The practicum ensures a breadth of experience in the major. Students should register each semester during the freshman, sophomore, and junior years. May be repeated for up to 6 credits. 1 cr. Cr/F.

#691. Field Experience in Theatre
Fieldwork with a regional or touring theatre. This advanced level internship allows the student to experience a professional theatre setting prior to graduation. Normally supervised by a qualified theatre professional in the organization with frequent consultation with a faculty sponsor. A written report is required. May be part- or full-time with credits assigned accordingly. Prereq: second-semester junior or senior standing; permission. Student must also register for a graded 4-credit independent study. Variable credit up to 8 cr. Cr/F.

693. Theatre Management
Theatre organization, fund raising, public relations, audience development, business and box-office management. Special topics may be explored. Prereq: four courses in theatre. 4 cr.

697. Junior Seminar
Required of all THEA majors. Explores the practical question: What will I do after I graduate? Students research and report on various professions and careers (inside and outside the theatre) as well as graduate and professional schools. Students also select and begin work on senior thesis projects. (Taken in the junior year.) 2 cr.

698. Senior Project
Further development and completion of senior project. Prereq: THEA 697. 2 cr.

729. Community-Oriented Drama Programs
Advanced practicum in designing, developing, and producing drama programs for the school and community. Includes audience analysis and marketing skills as well as adapting spaces, soliciting volunteers, and working with a limited budget. 4 cr.

741. Directing
Continuation of performance sequence. The director and performer develop interaction of the character. Ensemble playing. Full directing responsibility for a one-act play. Prereq: THEA majors only; THEA 552, 655, or equivalent; and 450, 436, or 438. 4 cr.

750. Writing for Performance
A) Playwriting; B) Screenwriting. Focus on original work with possible performances in other classes. Selected one-act plays will be eligible for entry into the Undergraduate Prize Productions performed in the spring semester. May be repeated for credit. Prereq: permission. 4–8 cr.

755. Advanced Musical Theatre
Emphasis on characterizations and directing techniques. Use of scripts and scores of representative composers, lyricists, and librettists. Prereq: THEA 655. Lab. Special fee. 4 cr.

758. Acting III
Continuation of THEA 551 and 552. Styles of drama for the actor: Greek, Shakespearean, 18th-century comedy, and 19th-century realism. Prereq: THEA 551; 552; 657;/or equivalent. 4 cr.

#768. Chamber Theatre
Choric speaking, reader's theatre, chamber theatre, and other forms of group interpretation in theory and practice. Prereq: THEA 457. 4 cr.

781. Theatre Workshop for Teachers
A) Puppetry; B) Storytelling; C) Play Production for the Elementary and Middle School Teacher; D) Makeup; E) Performing the Musical with Elementary and Middle School Students; F) Play Production for the Middle School and High School Teacher; G) Basic Choreography for the School Musical; H) Script Adaptation; I) The Use of Drama to Enhance Reading and Writing; J) Set and Lighting: Design and Construction Techniques. Each of these intensive summer workshops for elementary, middle, and high school teachers focuses on developing both play production skills and methods of implementing theatre techniques in the classroom. 2–4 cr. (Offered summer semester.) May be repeated.

#782. Advanced Theatre Workshop for Teachers
A) Puppetry; B) Storytelling; C) Play Production for the Elementary and Middle School Teacher; D) Makeup; E) Performing the Musical with Elementary and Middle School Students; F) Play Production for the Middle School and High School Teacher; G) Basic Choreography for the School Musical; H) Script Adaptation; I) The Use of Drama to Enhance Reading and Writing; J) Set and Lighting: Design and Construction Techniques. Each of these advanced, intensive summer workshops for teachers focuses on expanding both play production skills and methods of implementing theatre techniques in the classroom. 2–4 cr. (Offered summer semester.) May be repeated.

795, #796. Independent Study
Advanced individual study. Specific independent study opportunities are sometimes posted in the Theatre and Dance Department Office. Project, which includes a substantial piece of writing, must be developed with supervising instructor. May be repeated. 1–8 cr.

Tourism (TOUR)

Department of Resource Economics and Development
(For program description, see page 50.)

Chairperson: Bruce E. Lindsay
Coordinator: Robert A. Robertson
Professors: Edmund F. Jansen, Jr., Bruce E. Lindsay
Associate Professors: John M. Halstead, Alberto B. Manalo, Gus C. Zaso
Assistant Professor: Robert A. Robertson
Adjunct Assistant Professor: Marci Cobb
Extension Educators: Gerald W. Howe, Michael R. Sciabarrasi

400. Introduction to Tourism
Provides an informational foundation in tourism and gives a more extensive knowledge of the tourism industry. Examines historial perspectives, tourism organization, and supply and demand of the tourism industry. Discusses the dynamic and pluralistic nature of the tourism industry. Prereq: permission. 4 cr.

440. Tourism Attractions and Activities
Basic principles of planning, developing, and managing natural and manmade attractions. National, state, and local park systems, as well as private sector resorts, theme parks, and other tourist attractions are examined in view of their personal, economic, and social and environmental impacts. 4 cr.

460. Professional Values and Ethics
Managers in public and private tourist organizations need to concern themselves with their obligations to employees, consumers, owners, and the society at large. This course involves the study of organizational values and ethics related to these complex human interactions in tourism professions, and the values and practices that should shape and improve them. Prereq: TOUR 400. 4 cr.

500. Trend Analysis and Policy Development
The process of trend analysis as it relates to understanding the components of tourism policy development, implementation, analysis, and evaluation in the public and private sectors. Prereq: TOUR 400. 4 cr.

550. Tourist Characteristics and Behavior
Study of the socioeconomic, demographic, and psychographic characteristics of various types of tourist populations; specific emphasis on host-guest relationships and human development. Prereq: TOUR 400. 4 cr.

615. Tourism Planning and Development
The planning and development of tourist resources and programs within a geographic region. Planning models are reviewed and analyzed. The relationship among tourists, tourist developments, and the planning of tourist attractions and services is examined. A strategic planning process is applied to the development of a regional tourism plan in New Hampshire. Prereq: TOUR 400. 4 cr.

633. Economics of Travel and Tourism
Provides an understanding of both the microeconomic and macroeconomic aspects of travel and tourism. Using economics as a theory base, the course attempts to identify what is significant or special about travel and tourism compared with other activities. Special attention is given to issues such as resource immobility, capacity constraints, seasonality, and consumers' inability to experience the product before purchase. Prereq: TOUR 400. (Also offered as RECO 633.) 4 cr.

640. Travel and Tourism Transportation Systems
Overview of the various transportation modes. Planning, financial, operational, marketing, and evaluation aspects of the different systems of transportation modes. Prereq: TOUR 400. 4 cr.

660. Designing and Implementing Conferences and Meetings
Basic principles and theory of the planning and management of conferences and meetings. Use of steering committees, selection of resource people, site selection, exhibits, and relations to supplier personnel. Special attention to designing the core of the conference and related activities. Prereq: TOUR 400. 4 cr.

700. Marketing Tourism Services
Concepts, tools, and techniques of services marketing with specific application to tourism attractions and facilities. Provides an understanding of market research, consumer attitudes and behavior, market segmentation, product pricing, and quality control. Differentiates between advertising, promotion, and public relations. Prereq: MKTG 550; TOUR 400. 4 cr.

720. Domestic and International Destinations
A study of the geography of travel with emphasis on absolute and relative location destinations, and the cultural and physical features that distinguish them from other places. Prereq: TOUR 400. 4 cr.

767. Social Impact Assessment
Provides a cross-disciplinary perspective on the issues, problems, and methods of Social Impact Assessment (SIA). Provides analytic approach and theoretical framework for the assessment of diverse events, including changes in the natural environment, the local economy, or dominant technology. SIA is required of most U.S. and Canadian federal and state sponsored projects that come under the National Environmental Protection Act, as well as all projects funded by international donor agencies. (Juniors and seniors only.) 4 cr.

792. International Experience
Travel to a foreign country for study of a specific topic to be approved by student's major adviser. Prereq: permission. 4 cr.

794. Tourism Internship
Fieldwork brings students in a full-time, 15-week (600 hours) supervised situation where they have an opportunity to achieve a synthesis, transfer, and application of the academic experience in a setting similar to that associated with professional employment. Prereq: permission. 4 cr.

798. Independent Study in Tourism
Special assignments in readings, investigations, or field problems. Prereq: permission. 1–4 cr.

Water Resources Management (WARM)

Department of Natural Resources
(For program description, see page 51; for faculty listing, see page 159; see also course listings under Environmental Conservation, Forestry, Natural Resources, Soil Science, and Wildlife Management.)

500. Summer Work Experience
Work in the field of water resources management; must be performed under professional supervision or approved by natural resources faculty. Students are responsible for arranging their own experience. The department assists students in locating acceptable internships. Prereq: WARM majors. May be repeated. 0 cr. Cr/F.

504. Freshwater Resources
Major determinants of freshwater resources including hydrologic cycle and water balance, precipitation, stream-flow measurement, pollution, water supply and sewage treatment, water resource management and regulation. Special fee. Lab/field trips. 4 cr.

603. Watershed Water Quality Management
Principles of land use as they relate to water quality and quantity. Lectures focus on biogeochemical cycles and the watershed approach

to land and water resource management. Labs and field trips focus on methods of water sampling and analysis. One year of chemistry is recommended. Prereq: WARM 504 or permission. Special fee. Lab/field trips. 4 cr.

609, 610. Independent Study
Projects arranged according to student needs. Prereq: permission. 1–4 cr.

700. Issues in Water Resource Management
Detailed consideration of current issues in water resource management in a seminar format. Topics vary each year, but have included risk assessment, riparian rights, and the impact of water diversion on the water quality and ecology of lakes. Special fee. Prereq: WARM 603. 2 cr.

711. Wetland Resource Management
Analysis of the natural resources of coastal and inland wetlands and environmental problems caused by human use and misuse of these ecosystems. Special fee. Prereq: BIOL 541, or WARM 603, or permission. 3 cr.

713. Field Wetland Ecology
Field investigation of coastal and inland wetland types. First half of course consists of field trips to visit and sample regional wetlands. Second half of course consists of methods used to analyze field samples from wetlands. Enrollment is limited. Prereq: present or past enrollment in WARM 711. Special fee. Lab/field trips. 2 cr.

716. Wetland Delineation
Examination of the soils, vegetation, and hydraulic functions of coastal and central New England wetlands. Students are responsible for the collection and identification of aquatic plant species, the description of wetland soils, and the delineation of wetland boundaries. Two course options meet over five weeks (Friday and Saturday or Wednesday and Thursday) during July and August; 4 hrs. of lecture, 4 hrs. of lab, and 8 hrs. of fieldwork per week. For juniors, seniors, grad. students, and professionals. Prereq: permission. (Also offered as PBIO 716.) Special fee. 4 cr.

718. Wetland Evaluation
Lectures and field trips covering the theory and practice of wetland evaluation techniques with emphasis on the method for the comparative evaluation of nontidal wetlands in New Hampshire. Prereq: for juniors, seniors, grad. students, and working professionals. Field trips. Special fee. 2 cr.

719. Wetlands Mitigation and Restoration
Assessing the problems of wetlands loss. Asks: what steps can be taken, does restoration work, can habitat value be replaced, and what constitutes equivalent mitigation. First half of course involves field trips to visit and sample mitigation and restoration sites. Second half focuses on student projects using the scientific method to address wetlands issues. Prereq: WARM 711 or permission. Special fee. Lab/field trips. 2 cr. (Not offered every year.)

#721. Ecology of Polluted Waters
Impact of various water quality problems (e.g., excessive nutrient loading, organic matter loading, contamination by trace organic compounds) on the ecology of fresh waters, including microorganisms, aquatic invertebrates, algae, and fish. Design of impact assessment studies and data interpretation. Prereq: WARM 603, or RECO 528, or BIOL 541. Special fee. Lab/field trips. 4 cr.

795. Senior Thesis
Individual research guided by a program faculty member on a topic relevant to the student's area of specialization in the major. The research should employ skills and knowledge acquired by students during their tenure in the program and will result in a written thesis or scholarly publication. This course is open to all students in the program and is required for honors students. Prereq: permission. 4 cr.

Wildlife Management (WILD)

Department of Natural Resources
(For program description, see page 51; for faculty listing, see page 159; see also course listings under Environmental Conservation, Forestry, Natural Resources, Soil Science, and Water Resources Management.)

433. Wildlife Ecology
Historical, biological, ecological, and sociological factors affecting the wildlife resource and its management. Concepts in populations and their dynamics, communities, habitat, and management techniques. Special fee. Lab. 4 cr.

515. Wildlife Habitat Management
Wildlife habitats of New Hampshire; their structural components; useful techniques for creating and managing them. Prereq: course in dendrology or plant identification or permission of instructor. Special fee. 3 cr.

566. Wildlife Law Enforcement I
Fundamentals of wildlife law enforcement, its history, values, and the philosophy of managing people in the outdoors. Lab. 3 cr.

609, 610. Seminar
Seminars arranged according to student needs. A) Fire Ecology; B) Urban Wildlife; C) Waterfowl; D) Endangered Species; E) Introduced Exotics. Prereq: junior standing and permission. Special fee. Optional lab/field trips. 0–3 cr.

636. Wildlife Biology and Field Techniques
Introduction to major behavioral, physical, and physiological characteristics of wild mammals and birds; application of field and laboratory techniques used to study these characteristics. Prereq: one course in general ecology and statistics. Special fee. 4 cr.

#667. Wildlife Law Enforcement II
Techniques of wildlife law enforcement: dogs, computers, and other specific enforcement tactics. Hunter safety and conduct. Prereq: WILD 566 or permission. Lab. 3 cr.

695. Investigations in Wildlife Management
A) Wildlife Energetics and Physiology; B) Habitat Management; C) Population Dynamics; D) Waterfowl Management; E) Fire Ecology; F) Wildlife Management; G) Captive Wildlife Care; H) Landscapes and Wildlife Habitat. Prereq: permission. 1–4 cr.

737. Wildlife Population Dynamics
Mechanisms that influence and characteristics of terrestrial wildlife populations. Introduction to census methods and computer modeling. Special fee. Prereq: One course in general ecology and statistics; senior major or permission of instructor. 4 cr.

738. Wildlife Policy and Management
Wildlife administration and policy. Local, regional, and national wildlife management strategies. Contemporary management issues of fragmentation, commercialization of wildlife, and wildlife professionalism. 4 cr.

772. Wildlife Energetics
Energy requirements of wildlife species and the manner in which these needs are met in their natural environment. Thermodynamics in ecological systems, factors influencing metabolic rate, food habits, food-use efficiency, food availability. Prereq: permission. Special fee. 2 cr.

Women's Studies (WS)

(For program description, see page 38; for minor program, see page 23.)

Coordinator, Women's Studies Program: Cathryn Adamsky
Professor: Barbara A. White
Associate Professor: Cathryn Adamsky
Core Faculty: Cathryn Adamsky, Women's Studies; Kristine M. Baber, Family Studies; Susan D. Franzosa, Education; Cinthia Gannett, UNHM-English; Melody G. Graulich, English; Jean E. Kennard, English; Barbara K. Larson, Anthropology; Nancy Lukens, German; Janet L. Polasky, History; Mary E. Rhiel, German; Susan Schibanoff, English; Patrocinio P. Schweickart, English; Sarah Way Sherman, English; Raelene Shippee-Rice, Nursing; Laurel Ulrich, History; Barbara A. White, Women's Studies; Mara R. Witzling, Arts; Jack A. Yeager, French

401. Introduction to Women's Studies
Interdisciplinary survey of the major areas of women's studies; women's history, cross-cultural perspectives, women in literature, psychology of women, etc. Basic principles and concepts fundamental to more advanced women's studies research. Topics vary. Required for minor. 4 cr.

595. Special Topics in Women's Studies
In-depth study of topics not covered in regular course offerings. Prereq: permission; WS 401. 1–4 cr.

632. Feminist Thought
Theories of women's oppression and emancipation explored from various historical, political, cultural, and social perspectives. A major goal of the course is to increase awareness of historical and contemporary feminist approaches to understanding women's experiences, representations, and relative positions in societies. The course also considers the interrelation of theory and practice and the impact of past feminist theories on feminist movements. Prereq: WS 401. 4 cr.

795. Independent Study
For advanced students who have the preparation to carry out an individual project of supervised research on a specific women's studies topic. Preparation should include WS 401 or equivalent, and/or other women's studies courses. Prereq: permission of instructor and women's studies coordinator. Barring duplication of topic, may be repeated for a maximum of 8 cr. 1–4 cr.

796. Advanced Topics in Women's Studies
Advanced or specialized topics not normally covered in regular course offerings. May be repeated, but not in duplicate areas. Prereq: permission. 4 cr.

798. Colloquium in Women's Studies
Intensive study of specialized topic for advanced students. Topics vary with instructor. Prereq: permission. Required for WS majors and minors. Barring duplication of topic, may be repeated for credit. 1–4 cr.

Zoology (ZOOL)

(For program description, see page 52.)

Chairperson: John J. Sasner
Professors: Arthur C. Borror, James F. Haney, Larry G. Harris, John J. Sasner, Edward K. Tillinghast, Charles W. Walker, Winsor H. Watson III
Research Professor: Peter F. Sale
Adjunct Professors: Miyoshi Ikawa, Philip J. Sawyer
Associate Professors: John E. Foret, W. Huntting Howell, Thomas D. Kocher, James T. Taylor
Research Associate Professor: Ann C. Bucklin
Assistant Professors: Richard R. Olson, Michelle P. Scott
Research Assistant Professor: Michael Lesser
Adjunct Assistant Professors: David T. Bernstein, Michele Dionne, Richard Langan, Patricia E. Rosel, Barry J. Wicklow
Lecturer: Marianne Klauser Litvaitis

401. Human Biology
Elementary study of structure, function, and development of all systems of the body. No credit toward major or minor. Cannot be taken for credit after 507-508. 4 cr.

402. Environmental Biology
Basic interrelationships between organisms, populations, communities and their environments; ecosystems; human modifications of natural environments and their consequences. No credit toward major or minor. Students cannot use ZOOL 402 in place of BIOL 541 in the core curriculum. 4 cr. (Fall semester only.)

412. Principles of Zoology
Concepts of animal biology, introduction to ecological relationships, anatomy, physiology, embryology, taxonomy, and evolution. Special fee. Lab. 4 cr. (Spring semester only.)

460. Biological Illustration
Discusses scientific publishing, illustration labeling, color techniques, and printing processes. Presents an overview of several illustration techniques, including 1) Pen & Ink: wildlife illustrations; 2) Carbon Dust: half-tone illustrations using carbon pencil dust; 3) Colored Pencil: used on drafting film; 4) Watercolor: creates accurate and detailed illustrations. Student may choose to explore a single technique in depth. Course size limited to emphasize individual attention. Illustration subjects may be selected from a wide variety of material on Appledore Island. 2 cr. (Summers only at Shoals Marine Lab.)

474. Introduction to Field Marine Science
Non–biology majors experience the breadth of the marine sciences under field conditions at an island laboratory. Topics include: general marine biology, intertidal ecology, plankton biology, fisheries, and benthic (sea floor) communities. Reading, independent research, and scientific writing are included. Extensive use is made of rich and extensive flora and fauna found in the rocky intertidal zone of Appledore Island. Additional excursions are made to seal and seabird colonies on neighboring islands and whale feeding grounds in the Gulf of Maine. Field investigations are supplemented with appropriate lectures, films, and laboratory work. 4 cr. (Summers only at Shoals Marine Lab.)

503. Introduction to Marine Biology
A lecture course emphasizing the organization of marine biological communities. Various marine environments—pelagic, benthic, temperate, tropical—and their characteristic communities. Major emphasis on the approaches (e.g., analysis of energy flow and predator-prey interactions) used to analyze marine communities as well as the sampling techniques employed for each approach and the characteristic habitat type. Prereq: BIOL 411-412. Lab. (Also offered as PBIO 503.) 4 cr.

507-508. Human Anatomy and Physiology
All systems in the human body. Laboratories: a dissection of preserved cats and experiments with living tissues. Special fee. (Students may not receive credit for both ZOOL 507-508 and ZOOL 627.) 4 cr.

518. Vertebrate Morphology
Evolutionary and comparative examination of vertebrate anatomy. Structure of the major systems at the macroscopic and microscopic levels. Prereq: BIOL 411-412 or equivalent. Special fee. Lab. 5 cr.

542. Ornithology
Identification and biology of birds, especially those of northeastern United States. Field trips, laboratory, and lectures. Prereq: one semester of biology. 4 cr.

#560. Anatomy and Behavior of the Gull
Daily lectures; lecture demonstrations, laboratories, and fieldwork. Functional anatomy of all organ systems, with emphasis on sensory, nervous, digestive, and respiratory systems. The large nesting colonies of two species of gulls on Appledore Island will be used to demonstrate territoriality, aggression, mating, and other basic patterns of gull behavior. Prereq: one course in college-level biology. Staff. 1 cr. Cr/F. (Summer only.)

570. Coastal Ecology and Bioclimates
Practically oriented, emphasizes (1) the definition description, and measurement of major abiotic factors (e.g., radiation, temperature, atmospheric moisture and precipitation, and winds and currents); (2) the role of both biotic and abiotic coastal environmental factors with respect to plants and animals including humans; (3) the fundamentals of dynamic meteorology and short-term weather prediction from observing natural coastal phenomena such as cloud and wind patterns. Special attention will be given to the terrestrial and littoral microclimate of Appledore Island. Prereq: one year of college-level biology; some physics or physical geography preferred. 4 cr. (Summers only at Shoals Marine Lab.)

627. Principles of Animal Physiology
Introduction to the principles of animal function. The major systems (digestion, metabolism, respiration, circulation, osmotic and ionic regulation, nerve-muscle function, endocrine control) are covered with emphasis on functional mechanisms at the cell and tissue levels. Prereq: two years of the biology core curriculum. Special fee. Lab. 4 cr.

628. Marine Invertebrate Evolution and Ecology
Lecture and laboratory survey of invertebrate phyla; systematic morphology, phylogeny, and natural history. Prereq: BIOL 411-412. Lab. 4 cr.

629. Developmental Biology of the Vertebrates
Principles of animal development including metamorphosis, regeneration, and aging in selected vertebrates. Prereq: ZOOL 518; ZOOL 627; and BIOL 604. Lab. 4 cr.

635. Marine Mammals
Evolution, systematics, anatomy, ecology, and behavior of marine mammals and related forms. Prereq: BIOL 541 or permission. Restricted to ZOOL, BIOL, and ANSC majors. 3 cr. (Not offered every year.)

674. Field Marine Science
Daily lectures; laboratory and fieldwork. Offered at the Isles of Shoals in cooperation with Cornell University. Initial overview of the marine sciences, emphasizing living material in natural habitats; biology of intertidal plants and animals; biological oceanography; ichthyology;

and fisheries. Also introductory physical and chemical oceanography, marine geology, marine ecology, and the effects of human activity on the marine environment. Prereq: at least a full year of college biology. 6 cr. (Summer only.)

690. Evolution
Evolution is the change in properties of populations of organisms that transcends the lifetime of single individuals. Darwin's mechanism of evolution by natural selection accounts for the diverse adaptations of organisms to different environments. Topics include principles of heredity, sources and maintenance of variation, adaptation, speciation, levels of selection, and rates of evolution. Prereq: BIOL 411-412 or equivalent. 4 cr.

704. Endocrinology
Structure and function of vertebrate endocrine systems. Influence of endocrine system on the physiology of vertebrates, with special reference to mammals. Current investigations of the endocrine systems as a regulator and integrator of body functions including such systems as growth, reproduction, metabolism, differentiation, and behavior. Prereq: BCHM 658 or 751;/ or permission. 4 cr. (Also offered as BCHM 704.)

708. Stream Ecology
Ecological relationships of organisms in flowing water. Lectures on physical and chemical features of streams, floral and faunal communities, and factors controlling populations of benthic invertebrates. Streams as ecosystems. Lab exercises employ both field and laboratory experimental techniques. Occasional Saturday field trips. Weekly seminars on original research papers. 4 cr. (Not offered every year.)

709. Environmental Physiology of Animals
Animal responses to natural changes or extremes of the physical environment. Emphasis on adaptation of animals to major environmental parameters such as nutrient levels, light, temperature, ionic environment, etc., as well as temporal (seasonal, daily) changes in these major environmental factors. Examples from several levels of organization including biofeedback mechanisms. Prereq: BIOL 541, ZOOL 627, or equivalent. 4 cr. (Not offered every year.)

710. Ichthyology
Introduction to the evolution, systematics, anatomy, physiology, and ecology of fishes, with emphasis on New England species. Prereq: prin. of biol. or equivalent. Lab. 4 cr. (Alternate years.)

711. Zooplankton Ecology
Methods of sampling populations; factors regulating temporal and spatial distribution; trophic interactions of communities, role in nutrient cycle of lakes. Experimental techniques employed in field trips to freshwater habitats. Seminars examine current research. Prereq: gen. ecol. and limnology, ZOOL/PBIO 717, or equivalent; permission. 4 cr. (Not offered every year.)

712. Mammalogy
Evolution, ecology, behavior, physiology, and diversity of mammals. Focuses on conceptual issues, such as the relations of structure, function, physiology, and ecology of species; reproductive physiology and life history strategies; and the evolution of mating systems and social structure. Requires familiarity of mammalian groups to the family level and identification of local fauna to species. Prereq: BIOL 411-412 or equivalent. Lab. 4 cr. (Not offered every year.)

713. Animal Behavior
Introduces the naturalistic study of animal behavior. Emphasizes the evolution, development, physiology, and ecology of behavior. Topics include the genetic and acquired bases of behavior; neuroethology and behavioral endocrinology; communciation; orientation; foraging strategies; reproductive ecology; and the evolution of altruistic behavior. Prereq: BIOL 411-412 or equivalent. Lab. 4 cr.

714. The Ecology of Animal Behavior
An animal's behavioral patterns represent its ability to deal with the environment dynamically. Course focuses on ecological and evolutionary significance of behavioral patterns found in all organisms, particularly those animals that inhabit coastal marine environments. Strong emphasis on methods of behavioral research and interpretation of behavioral patterns using field observations conducted on diverse fauna of Appledore Island and surrounding waters. Prereq: introductory biology; experience in psychology, animal behavior, or ecology helpful. 4 cr. (Summers only at Shoals Marine Lab.)

715. Molecular Evolution
Molecular mechanisms of organismal evolution. Emphasis on integrating evidence from biochemistry, molecular genetics, developmental biology, and organismal studies. Review of population genetics and the neutral theory. Evolution of sex. Genetics of speciation. Methods of reconstructing phylogeny from molecular sequences. Prereq: BIOL 604 or permission. Some knowledge of statistics plus a computer language (BASIC or PASCAL) is recommended. (Also offered as GEN 715.) 4 cr. (Not offered every year.)

716. Quantitative Ecological Analysis
Methods of observation and inference in ecology; data reduction and exploratory analysis; detection of association, difference, and similarity using linear models and other multivariate approaches. Critiques of design and analysis of published studies. Prereq: formal coursework in statistics and ecology; permission. 4 cr.

717. General Limnology
Special relationships of freshwater organisms to the chemical, physical, and biological aspects of the aquatic environment. Factors regulating the distribution of organisms and primary and secondary productivity of lake habitats. Prereq: BIOL 541 or equivalent. (Also offered as PBIO 717.) 4 cr.

719. Field Limnology
Freshwater ecology examined through laboratory exercises with freshwater habitats. Methods to study freshwater lakes; interpretation of data. Seminars and occasional Saturday field trips. Prereq: present or prior enrollment in PBIO 717, ZOOL 717, or equivalent; permission. (Also offered as PBIO 719.) 4 cr.

720. Marine Biology for Teachers
Primarily for teachers grades 6 through 12, but open to others. Overview of living marine organisms (algae, invertebrates, fishes, marine mammals, and shore birds) and their environment. Fieldwork is emphasized; students who are certified divers or who wish to learn snorkeling are encouraged to use these techniques. At least one excursion on the lab's research vessel is included. Also such topics as coastal zone problems, marine fisheries, economics of marine organisms, and the educational resources of the marine environment. Participants encouraged to register for an additional credit to research and prepare lesson plans and teaching material for class use. Prereq: introductory biology. 3–4 cr. (Summers only at Shoals Marine Lab.)

721. Current Topics in Ecology and Evolutionary Biology
A lecture course dealing with a current topic in the general area of ecology or evolutionary biology. Possible topics include the structure of ecological communities, recruitment dynamics in marine organisms, the evolution of parental behavior, the genetics of speciation, top-down and bottom-up control of ecological systems, or the ecology of predation, among others. Prereq: BIOL 541, 604, or permission. 4 cr.

#723. Molecular Biology of the Eukaryotic Cell
Examination of dynamic interrelationships between cellular structure and function at molecular level. Viral, prokaryotic, and eukaryotic models are used to illustrate molecular regulatory mechanisms underlying biological complexity. Recent advances are presented against a background of fundamental concepts. Emphasis on normal and impaired cellular differentiation, growth, interphase function, and proliferation. Also considered are the coupling of energy to cellular processes, the role of bioelectricity, and intrinsic and extrinsic chemical messengers. Prereq: organic chemistry (CHEM 651-652, CHEM 545, or equivalent). Recommended: developmental or cell biology, biochemistry or physiology. 4 cr.

#724. Laboratory in Cell Biology
Complements class material (in ZOOL 723) and stresses use of modern research tools in addressing fundamental questions about the biology of the cell. Immunochemical techniques, traditional and innovative applications of electron and light microscopy, bioassay, cell culture and fractionation, and electrophysiology. Coreq: ZOOL 723. Special fee. 2 cr.

725. Marine Ecology
Marine environment and its biota, emphasizing intertidal and estuarine habitats. Includes field, laboratory, and independent research project. Prereq: general ecology; permission. Marine invertebrate zoology, oceanography, and statistics are desirable. (Also offered as PBIO 725.) 4 cr. (Not offered every year.)

730. Underwater Research
Hypothesis testing and experimental design, theoretical and practical aspects of sampling, and critiques of current research papers. Special problems of conducting research underwater (diving physics and physiology, theory and use

of diving tables, hyperbaric medicine), and underwater techniques (underwater photography and video, photo quadrats, tagging/marking, cages/enclosures). Students must supply their own equipment. Students with special research interests encouraged to enroll in an additional third week of independent underwater research. Prereq: recognized scuba certification, a medical examination, one year of biology or other supporting science. 4 cr. (Summers only at Shoals Marine Lab.)

740. Ciliophorology
Ciliophoran biology in depth. Lectures on: a detailed look at the ciliate faunules in Chesapeake Bay saltmarshes, sulfureta and plankton; Sippiwissett, Chincoteaque, Bermuda, Florida Keys, Sapelo Island, Rye Beach and other sandy sediment interstitial psammobiotic habitats; the marine snow ciliates of the Gulf Stream and the Saragasso Sea; the marine cave ciliates of Bermuda; and the ciliates of the East Pacific Rim. Laboratory exercises; silver-staining techniques; back-scattered and secondary SEM and TEM; and ciliate extraction, cultivation, and isolation. 2 cr. (Summers only at Shoals Marine Lab.)

750. Biological Oceanography
Biological processes of the oceans, including primary and secondary production, trophodynamics, plankton diversity, zooplankton feeding ecology, microbial ecology, and global ocean dynamics. Emphasis on experimental approaches. Term project involves either development of an ecosystem model or performance of a field experiment. Field trips on R/V *Jere Chase* and to the Jackson Estuarine Laboratory. Prereq: one year of biology or permission of instructor. Lab. (Also offered as ESCI 750.) 4 cr. (Offered in alternate years.)

751. Adaptations of Marine Organisms
Ecological physiology of selected algae and invertebrates from the Gulf of Maine. Offered at the Shoals Marine Lab (Isles of Shoals) in cooperation with Cornell University. Prereq: field marine science, plant or animal physiology, physiological ecology; understanding of chemical quantitative methods and analysis. 6 cr. (Summer only.)

753. Marine Vertebrates
Lectures, laboratories, and fieldwork on the systematics, ecology, and physiology of fishes, marine reptiles, marine birds, and marine mammals of the Gulf of Maine. Offered at the Shoals Marine Lab (Isles of Shoals) in cooperation with Cornell University. Prereq: field marine science or vertebrate biology. 6 cr. (Summer only.)

772. Fisheries Biology
Principles of fisheries science, with emphasis on techniques used to assess the biological characteristics of exploited fish populations, and the use of such information for fisheries management. Prereq: ZOOL 711 or equivalent; permission. Lab. 4 cr. (Alternate years.)

#775. Reproduction and Development of Marine Invertebrates
Cultivation, experimental and descriptive embryology, developmental energetics, substrate selection, metamorphosis, and ecological significance of reproductive patterns in major invertebrate groups. Prereq: ZOOL 674 (UNH), Biol Sci 364 (Cornell), or invertebrate zoology. Offered at Shoals Marine Lab (Isles of Shoals) in cooperation with Cornell University. 6 cr. (Summer only; not offered every year.)

777. Neurobiology and Behavior
Survey of fundamental concepts and recent discoveries in neurobiology. Topics include structure and function of neurons, development, cellular basis of behavior (sensory and motor systems), neuropharmacology, and neural plasticity (learning). Prereq: BIOL 411-412 or permission. 4 cr.

778. Neuroscience Techniques
Techniques and laboratory-oriented course designed for students of the behavioral and physiological sciences who wish to understand the basic electrophysiological properties of neurons and how they interact. Both invertebrate and vertebrate systems are called upon to illustrate principles of synaptic transmission, integration, sensory information processing, and the control of movement. Prereq: ZOOL 777 or equivalent. Lab. 4 cr.

795, 796. Special Problems in Zoology
A) Animal Behavior; B) Developmental Biology; C) Ecology; D) Electron Microscopy; E) Endocrinology; F) Evolution; G) Genetics; H) Histology; I) History of Biology; J) Invertebrate Biology; K) Parasitology; L) Physiology; M) Protozoology; N) Teaching Practices; O) Underwater Research; P) Vertebrate Biology; Q) Biological Techniques; R) Ichthyology. Students may elect one or more sections for advanced study. Reading, laboratory work, organized seminars, conferences. Prereq: permission. 1–4 cr.

799. Senior Thesis
Working under the direction of a faculty sponsor, students plan and carry out independent research resulting in a written thesis. Prereq: for students enrolled in the honors program entering their senior year. Two semester sequence; IA grade (continuous course) given at the end of the first semester. 4 cr.

University of New Hampshire at Manchester

The following courses are normally offered only at the University of New Hampshire at Manchester. For more information, see page 93 or contact UNHM at French Hall, 220 Hackett Hill Rd., Manchester, NH 03102, telephone (603) 668-0700; TTY 622-4511.

UNHM Associate Professors: Thomas D. Birch, Deborah Brown, John J. Cerullo, Cinthia Gannett, Gary S. Goldstein, Lewis Knight, Thaddeus M. Piotrowski, John P. Resch, Terry M. Savage
UNHM Assistant Professors: Mae Lynn Arlinghaus, Michael Contarino, Lorraine D. Doucet, Patrice A. Mettauer, Fred Metting, Steven R. Pugh, John E. Sparrow, Susan A. Walsh
UNHM Adjunct Assistant Professor: Peter Haebler
UNHM Instructors: Roberta Kieronski, Jeffrey F. Klenotic, John P. Lambertson, Jennifer Ann Lee, Elizabeth Lewis, Gail Rondeau, Karla E. Vogel, Jean Zipke
UNHM Faculty in Residence, Instructor: Mary C. McGuire

Administration

ADM 400. Introduction to Business
Introduces the study of business: examines the origins and development of American business, its place in a global economy, and its legal and ethical roles in modern society. Includes an overview of the functional areas of business such as finance, marketing, and organizational behavior. Designed for business majors as well as for students considering a major in business. 4 cr.

ADM 430. Introduction to Business Statistics
The use of statistical methods for managerial decision making. Emphasis is on understanding concepts, including inferences from sample data and model formulation, as aids in decision making. No credit for students who have received credit for DS 420, MATH 644, PSYC 402, RECO 528, or SOC 502. 4 cr.

ADM 532. Introduction to Financial Accounting
Fundamental concepts of accounting and their impact on the business world and society as a whole. Emphasis on the recording of economic transactions, and preparation and analysis of financial statements. No credit for students who have had ACFI 501, 502. 4 cr.

ADM 533. Introduction to Managerial Accounting
Emphasizes how organizational managers use accounting information to support their functions of planning, control, and decision making. Examples taken from corporations, small business, and not-for-profit organizations. No credit for students who have received credit for ACFI 503. Prereq: ADM 532. 4 cr.

ADM 547. Survey of Business Law
Overview of the law pertaining to business and business relationships including such areas as contract, agency, sales, partnership, negotiable instruments, and property. Case methods. Prereq: sophomore status or permission based on appropriate experience. Not equivalent to MGT 647-648, Business Law I & II. No credit toward any major at the Whittemore School. 4 cr.

Biology

BIOL 405. General Biology I
Survey of cells, molecular biology, genetics, and biotechnology. Emphasis on basic biological principles. For non–biological science majors. Lecture and lab. Cannot be taken for credit after completion of BIOL 411, BIOL 413, or equivalent. Special fee. Lab. 4 cr.

BIOL 406. General Biology II
Survey of the major plant and animal kingdoms as well as introduction to physiology, organ systems, and ecology For non–biological science majors. Lecture and lab. Cannot be taken for credit after completion of BIOL 412, BIOL 414, or equivalent. Special fee. Lab. 4 cr.

BIOL 413. Principles of Biology I
Lecture and laboratory introduction to biological principles; cell structure, function, replication, energetics, and transport mechanisms; physiological processes; Mendelian, molecular genetics, and gene technology. Suitable for all students; required for students majoring in the life sciences. Special fee. Lab. 4 cr.

BIOL 414. Principles of Biology II
Lecture and laboratory survey of the five kingdoms of life; physiology of cells, tissues, organs, and organ systems; evolution; human impact on the biosphere. Suitable for all students and required for students majoring in the life sciences. Cannot be taken for credit after BIOL 412 or equivalent. Special fee. Lab. 4 cr.

BIOL 443. Natural History of North America
Introduction to the major terrestrial, aquatic, and marine communities of North American continent. Consideration given to climatic, geological, and ecological factors that have shaped the continent and its natural communities. Designed specifically for students who are not planning to major in the sciences. No prerequisites. Special fee. Lab. 4 cr.

BIOL 445. The Human Body in Health and Disease
An introductory course on human anatomy and physiology designed especially for students not planning to major in the sciences. Emphasis is on material that will help students converse intelligently with physicians and other health care workers. Special fee. Lab. (Some animal dissection is required.) 4 cr.

Computer Information Systems

CIS 411. Introduction to Computer Applications
Beginning course on computer technology, specifically microcomputer systems. Emphasis is on (1) using computers to manage information for personal and professional applications and (2) the impact of computer information technology on today's society. Software applications used include word processing, spreadsheets, database, and graphics. Independent lab activities are a major part of the course content. No prior computer experience is required. Special fee. 4 cr.

#CIS 412. Microcomputers and Office Automation
Explores the modern automated office. Students investigate tools available for the office environment such as local area networks (LANs), telecommunications systems, and document management systems. Emphasis is placed on the worker's role in an automated office and socioeconomic trends that have affected the office environment. Students also gain advanced skills in software applications such as programming database applications and desktop publishing. Prereq: CIS 411 or permission. Special fee. 4 cr.

CIS 415. The Digital Computer
Survey of the modern digital computer including its construction, operation, capabilities, limitations, history, and social significance. Explores the role of programming and representing data in digital computers. Students use and develop activities using Hypercard authoring language. Special fee. 4 cr.

CIS 420. Computer Information Systems
Investigates the role and impact of computer applications on information systems in general and specifically as applied to business requirements. Surveys the components of an information system; explores information systems in areas such as manufacturing, medicine, education, and government; discusses the issues of computerizing information resources. Directs attention to information systems in business and identifies the need for and function of formal systems development methodologies. Students investigate the steps involved in transaction processing and develop a prototype of a business information system using a DBMS application. Special fee. Prereq: CIS 411, CS 406, CIS 415, or permission. 4 cr.

CIS 515. Multimedia: The Medium and the Message
Examines the history and underlying theory behind computer integration of text, sound, video, and graphics. Topics include: hardware and software requirements, design criteria, analysis of current hypertext, and multimedia applications in education and business. Students gain practical experience in developing multimedia applications on the Macintosh platform. Special fee. Prereq: CIS 411, CIS 420, CIS 415, or permission. 4 cr.

CIS 520. Database Management Concepts
Introduces students to the basic concepts of file and database organization. Special emphasis on understanding the steps involved in designing a database and using a relational model to define, search, report, and maintain a database. Discusses database security, integrity, and concurrency control. Also addresses the current trends in database development, such as distributed databases, natural language processing and expert systems, and object-oriented databases. Emphasis focused on the design and use of a relational model with practical experience using a DBMS application. Special fee. Prereq: CIS 411, CIS 420, CIS 415, or permission. 4 cr.

#CIS 542. Operating System Applications
Introduction to operating system concepts with relevant lab experiences. Operating systems for both micro- and mainframe computers; available utilities; the generation of batch files for operation of a LAN. Operating systems covered may include MS-DOS, UNIX, and VAX VMS. Special fee. Prereq: CIS 411; CS 406; or permission. 4 cr.

Economics

ECN 411. Introduction to Macroeconomic Principles
Studies how an economy functions. Develops measures and theories of economic performance to study such issues as unemployment, inflation, international trade and finance, and the level of national production. Examines government policies designed to correct for unemployment and inflation with close attention to the use of fiscal and monetary policies in the U.S. No credit for students who have received credit for ECON 401. 4 cr.

ECN 412. Introduction to Microeconomic Principles
Studies the behavior and interaction of fundamental decision-making units in an economy, especially consumers and business firms. Applies such economic principles as scarcity, supply and demand, and elasticity to a variety of social issues. Topics include the resource allocation problems of households and business firms, economic theories of social problems (such as crime, divorce, and discrimination), and the economic implications of government policies affecting the environment, the workplace, and industrial organization. No credit for students who have received credit for ECON 402. 4 cr.

ECN 540. Law and Economics
Study of various concepts, functions, and implications of law from an economic perspective. Topics include economic theories of property, contract, tort, crime and punishment; implications for resource allocation of laws related to product liability, taxation, work, education, housing, patents, and the environment are examined using tools of economic analysis. Prereq: ECON 402, ECN 412, or permission of instructor. No credit toward any major at the Whittemore School. 4 cr.

Humanities

HUMA 411. Humanities I
Introduction to the humanities and Western culture through literature, history, philosophy, music, art, and architecture. Examination of selected historical periods from classical Greece through the Renaissance through readings, films, slides, and field trips. Special fee. 4 cr.

HUMA 412. Humanities II
Introduction to the humanities and Western culture through literature, history, philosophy, music, art, and architecture. Examination of selected historical periods from the Enlightenment to the present through the use of readings, films, slides, and field trips. Special fee. 4 cr.

HUMA 519. Humanities: Classical Greece
Examination of the culture of classical Greece through the history, drama, philosophy, and art of the period. Open to all students. Recommended for students in the humanities concentration. Special fee. 4 cr.

HUMA 620. The Age of Mozart
Introduction to the literature, political writings, and historical developments of the period 1756–1791, the years of Wolfgang Amadeus Mozart's life. Materials from different fields—music, literature, theatre, film, political theory, and philosophy—to explore the life and work of the composer and the times in which he lived. Examines topics such as individualism, political revolution, the beginnings of romanticism, the revolution in science and technology, and

changes in economics and economic theory in readings and appropriate video and audio materials. No background in classical music is needed. 4 cr.

HUMA 622. Studies of Freedom and Liberty
Principles of freedom and liberty that helped to form Western culture from the Renaissance to the present. Topics include concepts of human nature, theories of government and society. Readings include Machiavelli, Locke, Paine, Mill, Marx, Freud, Sartre, and Marcuse. 4 cr.

HUMA 625. Social Justice in America
Introduction to theories of social justice and examination of historical examples of the law, economy, society, and public policy affecting social justice from the Colonial period to the present. 4 cr.

HUMA 630. The Development of Early Christianity
Examines the emergence of Western Christianity. Explores primary literature relating to religious concepts and theological positions during the first centuries of the Church from the Pauline letters, through the period of Roman Emperor Constantine, culminating in the writings of Augustine, Bishop of Hippo. Considers both Christian and non-Christian texts and assesses the forces that helped to shape the fledgling religion. Gives special attention to social, political, and cultural influences. 4 cr.

HUMA 660. The Moral Dimensions of Economic Life
Interdisciplinary examination of the moral implications of economic decisions, practices, issues, and events from ancient and modern perspectives. Topics include morality of trade, interest, profit, entrepreneurship, corporate takeovers, poverty, and wealth. Materials include philosophical and religious works (Aristotle, St. Thomas Aquinas), drama (Shakespeare), art and literature (Andy Warhol, Theodore Dreiser, F. Scott Fitzgerald), economics and history (Adam Smith, Jacob Viner), and films (Werner Herzog). 4 cr.

HUMA 680. New England Culture: Roots and Branches
Interdisciplinary examination of the richness, variety, and significance of selective periods of New England culture using literature, history, art and photographic images, music, artifacts, and oral histories. Subjects include native American lore, European-American contributions to regional culture, New England's literary tradition and influence on American culture. 4 cr.

#HUMA 695. Humanities: A Study of Creativity
A study of human creativity through representative lives and works of such figures as daVinci, Einstein, Kathé Kollwitz, Bach, Dickens, and Freud. Lectures, class discussions, films, and slides supplemented by gallery tours, plays, and concerts. Open to students with a background in humanities or by permission of the instructor. Special fee. 4 cr. Normally offered every other year.

HUMA 696. Humanities: A Study of Contemporary Issues
Current social and political issues with focus on recent developments in public policy, science, and business, and their impact on social values. Prereq: junior status or permission. 4 cr. (Normally offered every other year.)

Independent Study

UMIS 599. Independent Study
Independent study with the approval and sponsorship of UNHM faculty of material not covered in regular course offerings. Barring duplication of subject, may be repeated for credit up to a maximum of 8 cr. 1–4 cr.

Sign Language Interpretation

INTR 430. Interpreting: An Overview
A survey of traditional and contemporary perspectives on interpretation and interpreters; introduces the cognitive processes involved in interpretation and factors that influence those processes. Particular attention is given to interpretation as an intercultural, as well as interlingual, process. Special fee. 4 cr.

ASL 435. American Sign Language I
Introduction to American Sign Language with emphasis on visual receptive and expressive skills using mime, gesture, facial expression, and ASL grammatical constructions and linguistics. Participants develop their skills through videotapes, classroom participation, and readings that cover issues important to the deaf community. Limited to 15 students. Special fee. 4 cr.

ASL 436. American Sign Language II
Continuation of ASL 435 and expansion on concepts and principles. Focus on more advanced vocabulary and patterns of grammar; use of space and modulation of signs to denote aspects of time and location; and additional information on deaf culture. Prereq: ASL 435 or permission. Limited to 15 students. Special fee. 4 cr.

INTR 438. A Sociocultural Perspective on the Deaf Community
Introduction to the deaf community and deaf culture. Discussion of similarities to and differences from mainstream hearing culture. Supplemental videotapes focus on aspects of the culture including deaf education, autobiographical sketches, deaf norms and values, and deaf literature and folklore. Special emphasis is given to the role of the residential deaf school and the impact of mainstreaming. Pre- or coreq: ENGL 401. Special fee. 4 cr.

INTR 439. Ethics and Professional Standards for Interpreters
Discusses the social, political, and legislative forces that have had an impact on the development of ethics and professional standards in the interpreting field; comparisons are made with standards in other professions. Other topics include conflict resolution, negotiation, and business practices. Prereq: INTR 430. 4 cr.

#ASL 530. Conversational Sign Lab
Opportunity to use ASL conversationally with deaf instructors. Class is conducted entirely in ASL; instructors provide continual evaluation of and feedback on language skills. Prereq: ASL 435 and 436 or consent of program director. 2 cr.

ASL 531. American Sign Language III
Continuation of ASL 436. Expands on the groundwork and grammatical principles established in ASL I and II. Introduces the sociolinguistic aspects of ASL as it functions within the deaf cultural context. Limited to 15 students. Prereq: ASL 436 or permission. Special fee. 4 cr.

ASL 532. American Sign Language IV
Continuation of ASL 531. Expands on the groundwork and grammatical principles established in ASL I, II, and III. Introduces the sociolinguistic aspects of ASL as it functions within the deaf cultural context. Areas of investigation include use of formal versus informal sign register; sign variation by region, age, and gender; social factors that give rise to code switching; and political and cultural evolution of the U.S. deaf community. Taught in the target language using the direct experience method. Prereq: ASL 531. Limited to 15 students. Special fee. 4 cr.

#INTR 533. Practicum I
Experiential course providing the opportunity to work with deaf adults or children and with professionals in the field, particularly interpreters. Emphasis on observation and interactions. Prereq: ASL 436; INTR 438; enrollment in the interpreter training program. 2 cr.

#INTR 534. Practicum II
Students work in a variety of settings under the supervision of qualified interpreters and acquire experience in handling actual interpreting situations. Prereq: INTR 533. 2 cr.

INTR 539. Comparative Linguistic Analysis for Interpreters
Examines the basic similarities and differences between the linguistic structure of American sign language and spoken English; focuses on each language's communication functions and how they serve those functions. Prereq: ENGL 505 and/or coreq. ASL 532. 4 cr.

INTR 540. Principles and Practices of Translation
Introduction to theory and practice of translation. Students analyze pre-prepared interpretations and translations to discover how expert interpreters produce target language messages which are pragmatically equivalent to the source language messages. Particular attention paid to the form/meaning distinction. Students prepare translations and back-translations from texts of their choosing. Pre- or coreq: ASL 532. 4 cr.

#INTR 630. Principles and Practices of Consecutive Interpretation
Introduction to the theory and practice of consecutive interpretation. Analyzes and integrates specific subtasks of the interpreting process culminating in the performance of prepared and spontaneous consecutive interpretations. Students work with a variety of texts, language models, and settings with the goal of producing

a grammatically correct target language text which is equivalent to the source language text. Prereq: INTR 540. 4 cr.

INTR 636. Principles of Simultaneous Interpretation
Introduces the theory and practice of simultaneous interpretation. Particular attention is given to processes involved in transition from consecutive to simultaneous interpreting. The advantages and limitations of both types of interpreting are compared. Students apply theoretical information to the process of simultaneous interpreting. Special fee. 4 cr.

INTR 658. Deaf/Hearing Cultural Dynamics
Deaf and hearing cultures are compared, contrasted, and analyzed from a variety of perspectives; cultural interactions between deaf and hearing people are examined. Students apply fieldwork techniques to identify and record cultural conflicts between deaf and hearing people, and to describe the characteristics of the deaf/hearing group known as the "Third Culture." Prereq: INTR 438 and ASL 532. Special fee. 4 cr.

INTR 732. Simultaneous Interpretation of Discussions, Speeches, and Reports
Focuses on the simultaneous interpretation of group discussions, speeches, and reports. Students apply theory learned in INTR 636 to a variety of texts, language models, and settings. Prereq: INTR 636. 4 cr.

INTR 734. Field Experience and Seminar I
Gives students an opportunity to integrate previously learned knowledge and skills. Students work closely with an on-site supervisor in addition to attending weekly classes. Pre- or coreq: INTR 732. 4 cr.

INTR 735. Field Experience and Seminar II
Offers students an opportunity to specialize in an area of interest. Students work closely with an on-site supervisor in addition to attending weekly classes. Prereq: INTR 734. 4 cr.

INTR 744. Principles and Practices of Transliteration
The theory and practice of transliteration. Students analyze pre-prepared transliterations to discover how expert transliterators produce semantically correct messages in signed and spoken English which are equivalent to the source texts. They will then produce transliterations which are semantically and pragmatically equivalent to the source texts. 4 cr.

INTR 798. Special Topics
Selected topics that vary by semester. Possible course topics are Interpreting in Educational Settings; Transliteration; and Interpreting for Specialized Populations. Descriptions available in departmental office during preregistration. Permission required. (May be repeated for credit if topics differ.) 4 cr.

Special Topics

UMST 599. Special Topics
Occasional offerings dependent on availability and interest of faculty. Barring duplication of subject, may be repeated for credit. 1–4 cr.

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Concord, N.H. (1992–1996)

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President, Plymouth State college
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James S. Yakovakis, J.D.
Manchester, N.H. (1986–1993)

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Stanwood C. Fish, M.A.
Dean of Admissions and Financial Aid

Michael C. York, M.L.S.
Interim University Librarian

Stephanie M. Thomas, M.A.
Registrar

Faculty

(This listing is current as of January 1, 1994. The date of appointment appears in parentheses following the faculty member's name.)

*Aber, John D. (1987)
Director of the Complex Systems Research Center and Professor of Natural Resources and Earth, Oceans, and Space; B.S., Yale University, 1971; M.F.S., Yale School of Forestry, 1973; Ph.D., Yale University, 1976.

Adamovich, Frank W. (1968)
Associate Professor, Librarian; B.S., Fitchburg State College, 1960; M.S., Simmons College, 1968.

Adams, Robert L. A. (1967)
Associate Professor of Geography; B.A., Williams College, 1961; M.A., Clark University, 1966; Ph.D., ibid., 1971.

Adamsky, Cathryn (1981)
Associate Professor of Women's Studies; B.A., Clark University, 1955; Ph.D., University of Rochester, 1959.

Aikins, Janet (1979)
Associate Professor of English; B.A., Grinnell College, 1972; M.S., University of Chicago, 1973; Ph.D., ibid., 1980.

Aldrich, Linda (1991)
Research Assistant Professor of Recreation Management and Policy; B.S., University of New Hampshire, 1984; M.Ed., Boston University, 1986.

Alonzo, Roy S. (1969)
Thompson School Professor of Food Service Management; B.S., Boston University, 1953; M.B.A., Western New England College, 1961; Ed.D., Nova University, 1978.

Andersen, Kenneth K. (1960)
Professor of Chemistry; B.S., Rutgers, The State University of New Jersey, 1955; Ph.D., University of Minnesota, 1959.

Anderson, Franz E. (1967)
Professor of Geology; B.A., Ohio Wesleyan University, 1960; M.A., Northwestern University, 1962; Ph.D., University of Washington, 1967.

Andrew, David S. (1976)
Associate Professor of the Arts and the Humanities; B.A., University of Michigan at Ann Arbor, 1965; M.A., ibid., 1968; Ph.D., Washington University, 1977.

Andrew, Michael D. (1966)
Professor of Education; B.S., Cornell University, 1960; A.M.T., Harvard University, 1961; Ed.D., ibid., 1969.

Annicchiarico, Michael J. (1991)
Instructor of Music; B.M., University of New Hampshire, 1976; M.F.A., Brandeis University, 1981.

Annis, William H. (1962)
Professor of Occupational Education; B.S., University of Maine at Orono, 1951; M.Agri.Ed., University of New Hampshire, 1959; Ed.D., Cornell University, 1961.

Antosiewicz, Rose T. (1970)
Associate Professor of Italian and the Humanities; A.B., Brown University, 1954; Ph.D., University of California at Los Angeles, 1971.

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Enrollment Statistics—Fall Semester

UNH-Durham	1990–1991	1991–1992	1992–1993	1993–1994
	(Men/Women—Total)			
Freshman	958/1292— 2250	1075/1483 — 2558	1134/1401 — 2535	1114/1498 — 2612
Sophomore	1093/1397— 2490	995/1315 — 2310	1103/1423 — 2526	1099/1341 — 2440
Junior	1077/1272— 2349	1088/1331 — 2419	1036/1327 — 2363	1100/1395 — 2495
Senior	1053/1420— 2473	1136/1381 — 2517	1162/1525 — 2687	1121/1528 — 2649
1st Year—T.S.A.S.	165/112 — 277	152/ 96 — 248	165/ 109 — 274	188/ 123 — 311
2nd Year—T.S.A.S.	69 /51 — 120	84/ 73 — 157	81/ 57 — 138	89/ 63 — 152
D.C.E.—A.A.	72 /90 — 162	93/ 96 — 189	90/ 91 — 181	80/ 92 — 172
Graduate—Master's*	461/576 — 1037	497/ 644 — 1141	550/ 637 — 1187	520/ 642 — 1162
Graduate—Doctoral	185 /125 — 310	205/ 130 — 335	217/ 149 — 366	230/ 174 — 404
Total	**5133/6335 —11468**	**5325/6549 —11874**	**5538/6719 —12257**	**5541/ 6856 —12397**
Continuing Education Credit	653/941 — 1594	753/ 886 — 1639	701/ 895 — 1596	657/ 851 — 1508
Summer Session	1140/1861— 3001	1114/1792 — 2906	1872/1094 — 2966	1201/ 1976 — 3177

Baccalaureate Curricula	1990–1991	1991–1992	1992–1993	1993–1994	1990–1991	1991–1992	1992–1993	1993–1994
	Life Sciences and Agriculture				Liberal Arts			
Freshman	310	425	488	471	1056	1094	1086	1123
Sophomore	283	332	418	442	1351	1164	1146	1087
Junior	290	305	341	427	1026	1072	1039	962
Senior	284	318	341	394	1021	1005	1034	1017
Total	**1167**	**1380**	**1588**	**1734**	**4454**	**4335**	**4305**	**4189**
	Engineering and Physical Sciences				Whittemore School			
Freshman	350	380	399	359	320	406	315	326
Sophomore	302	287	319	320	283	245	337	251
Junior	312	315	320	364	389	359	270	309
Senior	348	361	368	345	394	397	400	282
Total	**1312**	**1343**	**1406**	**1388**	**1386**	**1407**	**1322**	**1168**
	Health and Human Services							
Freshman	214	253	247	333				
Sophomore	271	282	306	340				
Junior	332	368	393	433				
Senior	426	436	544	611				
Total	**1243**	**1339**	**1490**	**1717**				

UNH-Manchester	1990–1991	1991–1992	1992–1993	1993–1994
		(Men/Women—Total)		
Associate	140/ 164 — 304	133/ 157 — 290	118/ 173 — 292	137/ 191 — 328
Baccalaureate	26/ 94 — 120	57/ 122 — 179	84/ 167 — 251	120/ 221 — 341
Total	**166/258 — 424**	**190/279 — 469**	**203/340 — 543**	**257/412 — 669**
Continuing Education Credit	381/ 532 — 913	398/ 479 — 877	308/ 362 — 670	281/ 390 — 671

*Master's counts include Certificate of Advanced Graduate Study.

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